SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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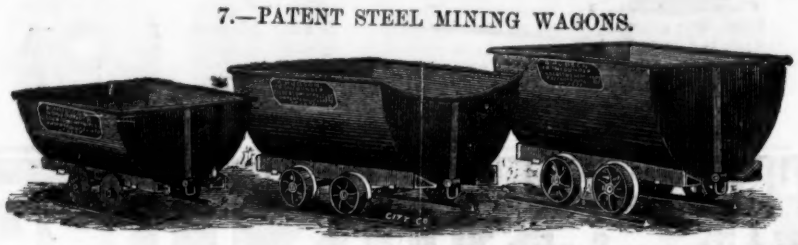
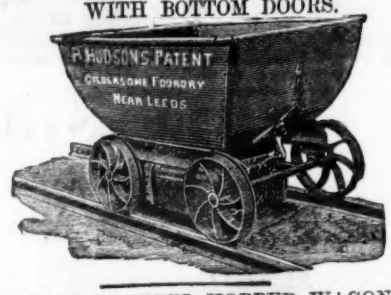


12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.



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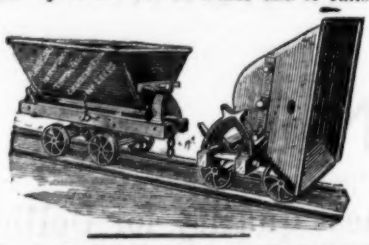

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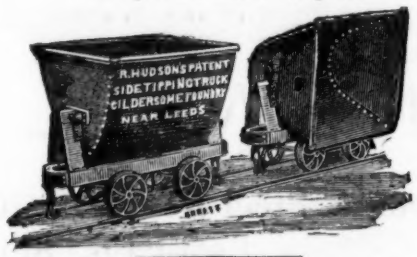
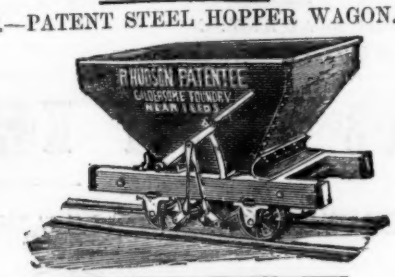
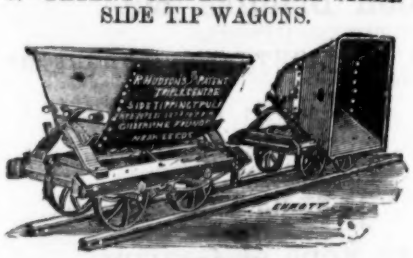


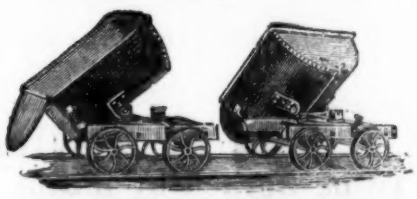
13.—PATENT STEEL HOPPER WAGON.



3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



9.—PATENT STEEL ALL-ROUND TIP WAGON.



14.—SELF-RIGHTING STEEL TIP BUCKET.
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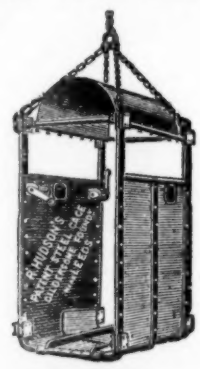

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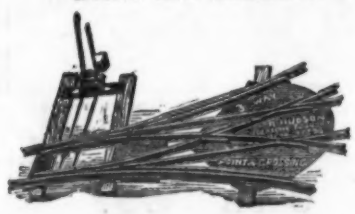

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AUSTRIAN GOLD AND SILVER MINES—No. V.

SIR,—Veins of gold quartz and silver ore exist in nearly every district of Carinthia, in addition to which there are large deposits of copper pyrites and quicksilver. A large copper mine has been worked at Gross Fragrant, and mines of quicksilver have been worked at Döllach. Mining for the precious metals has been carried on at Döllach, Ober Vellach, Flaltach, Millstadt, Spittal, and at numerous other places in the province. It would be impossible to go into particulars of the whole of them; I shall, therefore, confine this condensed report to those of the Gold Zecke, premising that the general particulars of these may be fairly taken as representing the value of all other mines in the district. Could a section be shown from Gross Glocknor in the west to Malnitzer Tauern Höhe in the east the strata would represent an anticlinal, having Hochnaar as the apex or centre ridge, from which the dip takes place. The mountains here consist largely of mica schist (some lepidolite), gneiss, chlorite slate, and serpentine overlaying gneiss, and rise to an elevation of between 3000 and 4000 metres.

On a rocky ledge free from ice, 2740 metres above sea level, stands the old mining house of the Gold Guild (the Gold Guild glacier extends from Hocknaar to Goldzechkogel, and thence to Sönnblück). This is the highest inhabited house in Austria, and if we except Monte Rosa the highest worked mine in Europe; it is distant from Döllach 18 German miles, and from Hieligenblut about the same distance. On the Seebichel beneath the Zirmlake, and 400 yards lower down the mountain side, stands the auxiliary mine buildings, consisting of two buildings, one containing 18 heads and the other eight heads of stamps (this latter is partially destroyed), a manager's house, workmen's rooms, sleeping apartments, and large stores. These are connected with the mines by a path leading past the Zirm lake, and under the upper mining house. The Zirmlake, which is 2506 metres above sea level, is crossed by means of a large boat.

These buildings are comparatively modern, having been built in the latter period of active work here, those previously used having stood 300 metres higher up the mountain, and nearer to Christoffis-tollen. Judging by the remains they must have been not only considerable in number but of great size. The buildings are a proof that these mines were most actively worked, and the immense heaps of attle, low grade ore, &c., prove without further search the enormous amount of work done in the adits and shafts. Of all the mines of the Upper Möllthal those of the Goldzecke are the largest and most extensive, and in former years produced a large part of the gold and silver obtained in such quantities in Carinthia. Unfortunately we have no statistics of the amount of precious metals produced here previous to the year 1549, at which date they came into the possession and were worked by Melchior Putz and Sons, which firm delivered to the mint between the year 1550 and 1604 31,737 ozs. of gold and 56,813 ozs. of silver.

The mines of the Upper Goldzecke, called the United Mines, consisted in 1653 of the following:—St. Bartholomew, Unser Frauen, St. Christoff and Glück, St. Michael, Dreikönig, Auffahrt, Dreifaltigkeit, Gottesgab, and Geist, which were all in full work. In 1676 the United owners sold the whole of these mines to Mathias Jenner, Balzthazar Wägner, and Jeremias Rainbmeyer, of Schwartz, who proceeded to work them under the title of the Schwartzer Company. The partnership, however, lasted only six years, Wagner and Rainbmeyer retiring, leaving Mathias Jenner sole proprietor. Between this time and the year 1719 frequent changes in ownership took place (so far as different members of the Jenner family were concerned), the mines were neglected, worked by mere labourers having no mining knowledge, and it is not, therefore, surprising to find that the production was not so great as it had been in former years. It is recorded that gunpowder was used here for blasting in the mine as early as the year 1655, there being a man specially appointed, who had charge of the firing, and who was paid according to the amount of ore brought down by the shot.

The mines appear to have remained in possession of the Jenner family till the year 1756, from which date until 1765 they were shut up and abandoned, or only worked by the miners of the neighbourhood for individual gain. In October of this year (1765) the Treasury took possession of the Annestollen and in the following year the Sehenschaffer district, and commenced to work there. They also repaired and partially retimbered the works at Sirngerstollen and Christofstollen, and the mines generally were put into working order, old stamps were repaired, new ones erected, and all work pushed actively forward. In 1777 several new mines were opened, but no regular plan would appear to have been acted on; a few trial borings were made here and there, old mines long ago abandoned were re-opened which did not pay, and finally in 1794 the mines were again closed. Evidence exists at the present day that those in charge could have had no knowledge of mining matters, adits and levels being apparently planned to avoid the veins, while a great part of the mineral thrown out and rejected from assays made is found to constitute the wealth of the property, and only treated as worthless on account of the utter ignorance of the reduction officer or manager. In 1834 work was recommenced, and much was done by way of repairs to the smelting-house and the remaining buildings, but no real mining was carried out. Why did not those interested continue the work? will be asked by readers. This question I have also asked, and am told want of capital compelled the suspension, and I think this must be so, as there can be no doubt but that lodes of unsurpassed richness exist here, only requiring the most ordinary mining knowledge to develope them, when, with adequate capital employed, the Gold Guild must prove a source of immense wealth to speculators.

Respecting the geological character of the district the principal veins or lodes are six in number, situated in the mica schist overlaying the gneiss, which is the bedrock of the Tauern district, and known as the central gneiss The veins have generally a strike north and south, with a dip 65° to 75° east. Their extent is enormous, running from Rollerkahrkor to Seeleiten, by Oexlingzecke and Hinternkaupt, the mines being situated all on one course, or on lines parallel to one another, extending to Mönschberg, where the veins probably penetrate the mica schist, calcareous shales, and the chlorite slates.

The nature of the lodes is similar to those of the Tauern district, both hanging and foot walls being particularly well defined, with but few faults or cross-courses. The vein stuff is made up of iron pyrites, hard quartz containing auriferous pyrites associated with lead glance, and a quartziferous rock containing free gold. The amount of free gold appears to be greater where the pyrites is also most abundant, free gold becoming scarcer where the pyrites lessens in amount and *vice versa*. Small nuggets or large grains of free gold have been found in the quartz sand, and a few years ago it is reported that a pocket of ore was discovered which assayed 0·050 per cent. gold and 0·040 per cent. silver. Some of the pyritical mullock is found in powder as fine as flour, of a dark earthy colour, and was on that account called by the ancients "black mock."

The Goldzecke workings were formerly divided into the upper, middle, and lower. The upper comprised the Fundgrube, Frauenstollen, and Bartholomeystollen; the middle, the Christoffestollen and Glückstollen; the lower, the Annastollen. It is quite possible that formerly there existed workings between the Fundgrube and the Frauenstollen, but if so they have been entirely lost, being covered by rock debris driven over them by the glaciers. Gold stone has been found here that assayed as much as 140 ozs. to the ton; but it would take up too much space to give particulars of all the assays that have been made, enough for the present for me to say is that the veins are everywhere rich, samples from waste heaps showing in some instances as much as 3 ozs. to the ton.

At Annastollen there is a mine house and accommodation for 40 workmen, smithy, storehouses, and ore repository. The vein stuff in the adit being rich in free gold in addition to silver, while the lead glance, copper and iron pyrites found in proximity are likewise rich in the precious metals. Seeing the richness of the whole district it is a matter of wonder as to why the works have been allowed to lie idle, and from what cause the failures took place. The conclusion forced on us is that science and mining knowledge has at no time found a place in Carinthia; the levels, adits, and shafts prove this. In addition the means adopted for saving gold or for smelting silver were also particularly defective. In the historical account the reasons are given for the mines being closed in 1604, and it is just possible, indeed more than probable, that the Protestant miners, from a presentiment that their mines must sooner or later be abandoned, were less anxious to open them out and to make reserves. Present gain was their entire object; they cared nothing for those who followed them, and every effort was made to get out the payable gangue, even at the expense of permanent injury to the adits and levels. Even under the Jenners' and later still under the Treasury no new work was taken in hand. The miners contented themselves with a sort of hand-to-mouth mining, and never gave a thought to prospecting. If a drive was commenced for the purpose of following up a rich vein the management was not only defective but the technical knowledge necessary was entirely absent; hence it was that their labour resulted only too often in costly expenditure without adequate return. With such management how was it possible to realise profits? Comprehensive and well-directed operations are requisite, and above all skilful and trustworthy managers. In commencing work at these mines attention should be paid or rather fixed on the liegendkluft, and a cross-cutting should be driven from there to the Annastollen. It has been observed that at an interruption or at a fault the veins branch away, sometimes vertically and sometimes horizontally, these branches or forks terminating in rich pockets of ore. The old men of the mountain knew of this, and carefully worked out the "cross clefts." In modern times, however, this appears to have been lost sight of. In the vicinity of Brixnerzecke an adit would undoubtedly result in large quantities of valuable rock being got out; the liegendkluft might then be sunk, and if possible a communication established with the Schwartzen adit, by which means a valuable reserve would be created. As a means towards utilising the heaps of mixed ores the Böswetterschacht, which has partially fallen in, should be strengthened and restored, not only that the vein stuff may be conveyed thereby, but as a means of communication for the miners.

The large heaps of ore at the Christoffelaufe would furnish material to be treated for a long time to come, as without doubt they contain sufficient of the precious metals to pay well. Thus in spite of former neglect and the rigorous climate with care, attention, business, as well as practical ability the mines of Carinthia have an undoubtedly prosperous future. Much can be done by men who have their heart in their work. The gold is there; let me express a hope that before long a part may be extracted.

F. KENSINGTON.

MINING IN AUSTRALIA.

SIR,—In a former letter I stated my intention of supplying you from time to time with such notes regarding mining in Australia as I might think would interest the readers of the *Mining Journal*. I have not long returned from a two months' business trip inspecting coal, tin, and gold properties in New South Wales, and I purpose now making a few remarks on what I saw.—COAL: The report of the mining department of that colony for 1882 gives the export of coal from Newcastle during that year as 1,080,446 tons, or an increase of 217,412 tons over that of the preceding year. This statement will suffice to show the condition of this coal district, and, I may add, the increase still continues, so I am informed. Victoria is the largest customer, taking 403,510 tons in 1882, or 35,093 tons more than in 1881. The Government is now constructing a railway from Sydney to Newcastle, and, as I travelled over a portion of this line at the Newcastle end, I can say the contractors there are very rapidly doing their work. This railway is naturally expected to materially aid in the development of the very extensive area of country (under which, I have no doubt, lie very considerable seams of coal,) through which it passes. Speaking generally, the dip of the beds of coal and strata is to the south-west, and a grand future undoubtedly lies before much of the country lying in that direction from Newcastle. The Diamond drill is now there at work, and will soon indicate the hidden coal resources of this new district. I noticed in more than one place faults, the effects of which cannot yet be foretold; but it is very likely some of the numerous railway cuttings will throw considerable light on this important subject, as well as the drill-bores. Some of the Newcastle collieries have made very large profits; one, since 1863, upwards of 320,000*l*., another has paid back 6*l*. out of 10*l*. of its capital, and the reserve fund nearly equalling the balance; the income of another, on a capital of 130,000*l*., exceeded 50,000*l*. per annum. I need not, however, enumerate. This district is rapidly increasing in importance and wealth. On the north shore of the harbour, and quite close to it, a shaft is now being sunk through the shelly shingle drift and water by iron cylinders, the diameter being 16 ft. The drift and water are raised by a very simple pumping apparatus. The depth attained at the time of my visit was 55 ft., and it was not expected that the drift sand would continue more than 10 ft. deeper before reaching a stiff blue clay. It is intended to sink the shaft the full depth of 342 ft. to the 13 ft. coal seam by cylinders. This work is being carried out by colonial capital and engineers.

TIN.—After leaving Newcastle I went north to the New England district, 260 miles by rail and 90 miles by coach, the weather being oppressive, and the journey not improved by bush fires on each sides of the road. The heat in Newcastle was certainly tempered by the evening sea breeze, but at Inverell and neighbourhood it had ranged for many days from 104° to 110° in the shade, and several had then to pass ere we got a thunderstorm, rain, and a cooler atmosphere. My visit to the Tingha tin field in this vicinity was a short one, but it gave me sufficient time to note that only the heads of the old river bed had been touched, and that under the basalt lies very large tracks of stanniferous river wash not yet thought of by the local miners, who are engaged in working the shallow deposits. There appears to be three distinct deposits of tin ore here of different ages—a recent alluvial, and two deposits under basaltic rock. The alluvial ground is nearly all worked out; a large number of Chinamen are, however, still making a good living in and about the old shallow workings. With capital and a systematic method of mining and washing, this district will yet see better days and more profitable mining.

There is a tendency too prevalent in outside districts to work mines supported by distant capitalists mainly for the benefit of the locality in which the mining operations are carried on. In the end this simply means driving capital away, and labour with it, and the impoverishment of a district that often contains profitable resources for the investment and outlay of capital. These remarks are not particularly applicable to the district I have just been referring to, but apply generally to a large number of mining districts that I visit, where the sole aim of the local storekeepers and other residents appears to be the expenditure of as much money as possible in the place, regardless of the almost inevitable result of living for the present and without thought for the future. This sort of policy as a rule means the certain collapse of mining, desertion of miners, and ruin of the prospects of a fair field through the narrow, selfish views of ignorant men.

I must journey on another 80 miles to the Emmaville (or old Vegetable Creek) tin field, where mining has been carried on much more vigorously, economically, and profitably, although the tin deposits much resemble those of the Tingha district. The principal tin mine at Emmaville is the Wesley, from which the present company has obtained 1934 tons of tin ore, which enabled them to pay 44,000*l*. in dividends, and a considerable area of the two "leads," or ancient river beds (the shallow and the deep), beneath the basalt, still remains to be worked out. Both the tin fields I have been referring to are situated in granitic rocks. The shallow "lead" in the Wesley Mine crosses the deeper one, a layer of basalt separating them. Prospecting operations are being carried on lower down this old valley for quite eight miles by shafts sinking through the basalt, and one or two shafts have obtained very encouraging prospects, but the rest have been impeded by water. Still lower down, as far as 12 and 21 miles, tin mining is going on, but whether in the upper or lower wash I cannot say, having only visited one mine, and that I think, is in the upper "lead" or newer wash. In viewing a stanniferous "lead," gold miners are apt to overlook the difference in specific gravity between gold and tin (as 19 is to 7), and the probability of the latter being transported in considerable quantities for over twice the distance of the former—from their original sources in the bed rocks. Of course in tin mining we have another element also to consider, the market value of the metal, which does not enter into the calculations of the gold miner. Mr. Wesley and party were the first tin miners in this part of Australia to sink through the basalt in search of an ancient tin-bearing river lead. They were eminently successful as they deserved, and found rich tin deposits of extensive proportions. Mr. Wesley is again pioneering the deep sinking for the continuation of the deepest "lead" beneath the thick covering of basalt, some eight miles down the "lead" below his first venture. His shaft is already down 225 ft., in basalt all the way, and his enterprise merits the success he will probably win. At the head of this field a belt of country exists through which runs numerous veins of tin ore, and it was from the destruction of these veins for the most part that the old river beds accumulated and sluiced out their rich deposits of tin ore. Another stanniferous belt crosses the old main valley or "lead" some six miles lower down, and this second belt will probably prove a second feeder to sustain the richness of the old river bed in its extension. Although tin veins are plentiful for a considerable area of country in New England, yet only a few are being mined. Many very rich patches of tin ore have been found in them, but this branch of tin mining will not be carried on extensively, I think, for many years, and then only when the old river beds are nearly worked out, and the price of tin is higher than at present, 85*l*. A very large number of Chinese are also engaged in tin mining on this field under the tribute system.

TIN ORE REDUCTION—DRESSING.—I notice a disposition in these colonies to reduce tin ore much too fine in the first operation, which is I think a mistake, as it leads to the production of a considerable quantity of slime, and the loss of much tin ore in consequence of so doing. Tin ore is a very brittle mineral, and veinstuff should, therefore, in the first operation only be reduced to the size of the grains of tin ore which occur in the lodes or veins. It should then be dressed, and all the coarse grains saved. The residue should then again be reduced to (say) half the size, dressed, and again reduced, until it is found that the ore will not pay to further treat. Jiggers will be found very useful in this method of treatment, and I should say Marsden's new patent fine crusher or pulveriser or similar machines. My Cornish friends may take exception to my remarks; but from what I recollect of tin mining in Cornwall some 25 years since, and from what I gather is their method now, I cannot help thinking their very large and expensive dressing-floors or establishments could be very considerably and economically diminished. The system I have roughly sketched will, I believe, be eventually adopted here as most suited to our tin ores, and it will equally apply to those of Cornwall. I am sorry to observe from your columns that many Cornish tin mines are ceasing to become remunerative, and are being stopped, notwithstanding that many of them contain tin lodes of fair percentage. It is, therefore, necessary that those interested should endeavour to find out some method by which they can reduce the cost of dressing, and at the same time increase the output of tin. Miners are notoriously conservative all the world over, but the present low price of tin demands revision and reform in the several departments of tin mining, or the partial collapse of the industry is inevitable. From my remarks and suggestions it may be conceded that I take some interest in the progress of mining in the "old country," and I hope my intentions to aid your miners will not be misconstrued by any of your readers. Sometimes it is advisable and necessary to review the past without prejudice, and earnestly endeavour to find out a better method of conducting business in the future. A period for such action appears to have arrived in tin mining. It should be courageously faced, and the knife fearlessly used for the ultimate good of "One and All."

I little thought when I commenced this letter that I should ramble into such a dangerous topic as "Reform in Mines," when I began with the intention of only giving a few notes on mining at the antipodes. I must apologise and get on to my right track again. On my return to Newcastle I again visited some of the coal mining districts.

GOLD MINES—VEIN MINES.—I next inspected some gold mines near Orange, in the western part of New South Wales. The mode of occurrence of gold in the veins of one mine (New Reform) are worthy of more than the passing notice which I must give in this letter—out of regard for your space. I will, however, supply more details in future. The auriferous veins in this mine occur in the junction wall between serpentine and diorite. This wall runs nearly east and west, and has an underlie to the north. The veins are lenticular in form horizontally, like shoots or pay chimneys vertically, have an easterly dip of about 50°, and, of course, make north with the underlie of the wall as they increase in depth. These veins are distinct from one another, often being from 50 to 100 ft. distant. They range from a few feet in length to 50 or more ft., in width, from a few inches to several feet. The vein stuff or gangue consists, for the most part, of carbonate of lime and quartz. The greatest part of the gold is contained in veins of arsenical pyrites which traverse the carbonate of lime, and but little free gold is obtained. Where quartz is found the veins are very poor, and almost void of pyrites or any other mineral. Galena and zinc blende in small quantities, are occasionally associated with the gold and arsenical pyrites. What are locally called bonanzas, or solid patches of auriferous pyrites of 1 cwt. or more, are occasionally discovered, and these sometimes yield gold at the rate of upwards of 4400 ozs. to the ton. Above the water level in this mine the gold was nearly all free gold, the pyrites and carbonate of lime having been decomposed by Nature's operations, and it was extracted very easily. Now the auriferous ore is shipped to London for treatment.

ALLUVIAL MINE.—About 10 miles distant from the New Reform Mine an alluvial deep lead or old river bed has been discovered at 200 ft. beneath the basalt rock which covers a considerable area of country in this neighbourhood. The lead in this mine (Extended Freehold) is now in full work. The wash dirt is put through a light battery of stamp-heads, and yields an average of nearly 1 oz. of gold to the ton. I have little doubt, judging from my inspection of this district, that other and more extensive, and, probably, richer leads exist beneath the basalt of this place. After leaving this gold field I next visited the Adelong gold field, which is situated in the southern part of this colony. But before I proceed further I should mention that the bed rock of the deep lead above referred to is diurite decomposed.

ADELONG GOLD FIELD.—This mining district is also very interesting. Its auriferous lodes or reefs consist of quartz for the most part, and they traverse channels of apparent altered slate, which run through the primitive granitic rock of this district. These channels are nearly vertical, and the Great Victoria Mine has sunk on one to the depth of 1100 ft., carrying a productive reef down with them. This company has just received the Government reward for the first discovery of payable gold in New South Wales below 1000 ft. in depth. The main channels and reefs strike nearly due north. There are also reefs that run through the granite at an angle with these, and productive ones too, but they have as yet received but little attention by miners, and the work done is of a primitive kind, all underhand stoped from the surface and the veinstuff drawn to the surface by whips. The auriferous portions of the reefs here are found to contain iron pyrites, galena, and zinc blende. Although some of the mining operations on this field are carried on in the primitive fashion described, yet the crushing batteries and operations carried on in other parts of it are not surpassed in Australia. There are Diamond drills, rock borers, air winches, locomotives for removing quartz to the battery, and all the latest improvements in gold amalgamation and extraction, pyrites furnaces, &c. Certainly a strange association this of primitive and advanced modern mining on the same field in operation at one time.

I must postpone further detailed references to the lodes or reefs of this district to a future letter, and conclude this one, as on leaving this field I made my way back to Victoria, the border country of which colony I had now reached, concluding a journey of very nearly 3000 miles, by trains, coaches, steamers, buggies, and horseback.

That there are extensive fields for the remunerative investment of capital in New South Wales gold, tin, and coal properties I think I have indicated. Before investment, however, thorough investigation

and examination should be made as to what will or will not pay in each district.

WM. NICHOLAS, F.G.S.
Exchange, Melbourne, April 15. Consulting Mining Engineer.

UNITED STATES OF COLOMBIA, STATE OF TOLIMA.—No. III.

SIR,—The River Luisa, that flows by the village of Miraflores, has always been considered of importance from the gold contained in its sand and gravel, and a few places are still worked. Six miles north of the village are some sand banks about 100 ft. high, with no pebbles even in them, so that in the rainy season they are continually caving in and falling into the bed of a small stream, which at that time of the year contains a considerable volume of water. The sand carries with it gold in the finest state of division, and some of this is caught by means of dams or riffles laid across the course of the stream, and when the flood subsides the owners wash the sand in bateas and get a fair show of gold. The bedrock is a ledge of sandstone, and, probably, a shaft sunk through it would show far richer gravel underneath.

North-east of Miraflores is the abandoned mine of El Sapo. It has never been worked since the Spaniards were forced to flee from the country, owing to their losing the battle of Boyacá in the year 1819; and, in consequence of this or some other fight, they retreated so precipitately that some of the furnaces remain charged with the ore. The lode is visible in the hill-side near the stream, and is 5 ft. wide, of solid grey copper, and assaying about 36 ozs. of silver to the ton.

We next come to the River Coello, on a tributary of which, called the Combeima, is built the town of Ibagué, and the country rock is micaceous schist, inclined at an angle of 45° to the horizon, until it gradually becomes vertical at its junction with the trachyte. A Dominican friar discovered a cinnibar mine near here in the last century, but the strings are very narrow, and nobody has taken the trouble to attempt to work it; probably there are some other lodes in the same neighbourhood, as much as 7 lbs. of ore being washed in a panfull of dirt from the bed of the stream. Some of the more enterprising inhabitants have opened up an old Spanish mine called La Josefina, and from the samples already obtained from the back of levels, &c., there appears to be ore which will amply remunerate them for their trouble.

West of the town, and close to the road which passes from Tolima to the Cauca, is the mine of Tocheoito. It was started by a firm of English capitalists, and a mill and other edifices erected, but nothing was ever done to prove the real value of the property, the ore of which ran about 2 ozs. of gold to the ton.

Little is known about that part of the country which lies between Ibragué and Lerida; the extreme summits of the Andes being clothed with perpetual snow west of these towns show the great elevation the mountains attain, as the snow line is, with the exception of one gap, continuous for upwards of 30 miles. Before arriving at Lerida the traveller passes by the town of Venadillo, where, according to the historian Alcedo, there was a very rich gold mine, and it is supposed that the lost mine the Spaniards worked under the name of Santa Agida, is hidden in these hills. The gravel mines of Libano, to the west of Lerida, are at the height of 3000 ft. above sea level, and between the village of Libano and the town of Manizales, in the State of Antioquia, to which there is a high road passing over the Ruiz at an elevation of 14,000 ft., and just below the snow line, there is a very rich gold mine, which paid from its first discovery. The ore being in strings rarely more than an inch thick, was at first picked out and ground by hand on stones, and then washed in pans, but now it is regularly mined and treated in a more economical way.

The gravel deposits are now so distinct a feature of the country that they form what are called lomas, these are really hillocks covered with grass, and only with trees in the ravines, where water flows in the rainy season; these lomas are 2000 to 3000 feet above the level of the plain, and the lower part is denuded of gravel, whilst on the upper, deposits are made when the bedrock is composed of schist, but where the granite is erupted then nothing has reated; again, when clay is associated with the gravel, forest trees have soon sprung up, contrasting with the bare hills on which gravel alone is found.

It is interesting to note that the auriferous gravel is now at about the same relative distance as it was at Natagaima from the river Magdalena, before it took the great semicircle of the Saldaña and Ibagué plains, and its height above sea level is almost identical with the gravel found at Hobo, whereas the river in its descent has lost 1500 feet, and from this point the deposits gradually rise until at the Fresno mines they are 4500 feet, and the Magdalena in a direct line east is only 700 feet above the sea.

The River Lagunilla has to be crossed, and on arriving on its northern bank there are seen some old Indian workings, and some levels driven on a quartz lode; these are very difficult to explore, as close to the mouth of the most accessible is a winze full of water, caused probably by some lower levels having run together, as they are situated in the bank of the river 2500 ft. above its level. Evidently there was a mine here of some importance, as traces of a big ditch, with launders carried across the face of bare rocks, and iron chains hanging from bars are to be seen; and although the Lagunilla is very rapid flowing, taking its rise about 30 miles off in the snowy mountain of Ruiz, the ditch must have been a long one, and the mine of some value before they brought the water on to a height of 2500 ft. It is said that the great catastrophe of this neighbourhood in 1829 was caused by an earthquake, which expended its force on the line of this lode, causing such enormous landslips on the southern, as well as the northern, banks that the river was dammed up for three weeks, and finally bursting its way through it overflowed the country, where it debouches on to the plain with a mass of mud, stones, &c., covering up and rendering completely level what was before this event an undulating country, and now is a fertile country, although at the cost of a great many human lives; great numbers were saved through the exertions of the neighbouring people who made rafts, and poled about amongst the mud, taking the survivors out of the tree tops and higher land.—*June* 18. H. J. C. WILLIAMS.

CALIFORNIA QUICKSILVER TRADE.

SIR,—It is noteworthy that the only cinnabar deposits developed in the United States have been found in California, though in the past few years one or two deposits have been worked to a limited extent in Nevada. That so many deposits of this kind have been found in California is remarkable. These deposits are not confined to any one section. They exist both north and south of San Francisco, and also to the east. They could also be found to the west if the waters of the ocean did not wash that boundary of San Francisco. The most extensive deposits have been discovered in Santa Clara county, about 50 miles south of San Francisco. The most famous deposit is that of New Almaden Mine, just south of San José. This has been the main stay of the market all along. It is worked by a New York incorporated company. There are other mines still further south. The New Idria, the next in importance to the New Almaden, is in Fresno county. There are some prominent mines of this character north of San Francisco in Napa, Lake, and other counties.

Prior to the discovery of cinnabar deposits in California, all the quicksilver used in this country was imported from Spain and Austria by way of England. The most noted mines of Europe are the Almaden in Spain, and the Idria in Austria. The former has been mined for hundreds of years, and shows no signs of exhaustion; but it is not worked on the American plan of going for everything in sight, and getting at the bottom as quickly as possible. Still the Almaden Mine has yielded a large quantity of mercury. According to an elaborate report by M. H. Kuss, M.E., prepared a few years ago, the product of the Spanish Mine from 1564 to 1875 was as follows in various periods as divided by the author:—

From 1564 to 1700 .....Tons	17,863·720
From 1700 to 1800	42,149·501
From 1800 to 1875	60,166·379
Total tons Spanish	120,179·600

This is equal to 3,482,758 flasks of 75 lbs. Spanish, or 76·07 lbs. avoirdupois each. The estimated product from 1875 to 1883 is 350,000 flasks, making a total of 3,832,758 flasks from that mine in the last 319 years, or an average of 12,000 flasks a year.

If the Almaden Mine had been in California instead of Spain, and there had been any kind of show for the product, it would not have taken 319 years to have produced the quantity credited to that mine. We rush things through in this country without much regard to posterity. As we found an inheritance in the soil we take it for granted that our children and children's children will do as well. So instead of trying to make our resources last as long as possible, we try and see how soon we can exhaust them, and how much money we can make out of them for present wants. An apt illustration of this is found in the product of the California mines for the last 34 years as compared with the two most noted mines in the world outside of California. We, of course, refer to the Almaden and Idria Mines. The figures for the illustration are furnished by Mr. J. B. Randol, agent of the New Almaden Mine of California, and are as follows:—

		Flasks.
California products, 34 years		1,357,403
Spain	1,044,139	
Austria	272,834 =	1,316,973
Increase for California		40,430

Thus with all our disadvantages of dear labour, as compared with Spain and Austria, and our distance from the leading markets of consumption, California has produced more quicksilver in the past 34 years than the combined production of the famous Almaden and Idria Mines of Spain and Austria. What would have been the yield of California if labour and other expenses of production had been on a par with Spain we do not dare say. It would certainly have been much more than the world's production for this period, because the lowest price at which the article could have been sold would have greatly increased the consumption. The mines of Italy and other European countries are supposed to produce about 2000 flasks per annum. Recently Mr. Randol, of this city, prepared a chart showing the product of California mines from 1850 to 1883, together with the exports from California by sea and land, with the prices here and in London, and the product of the Almaden and Idria Mines. Most of this information will be found in the annexed table:—

Year.	Yearly products. Flasks.	Total exports. Flasks.	Price. Highest.	Price. Lowest.
1850...	7,723	6,467	$1·50	$1·10
1851...	27,779	10,791	1·00	75
1852...	20,000	21,458	80	72½
1853...	22,284	18,800	72½	72½
1854...	30,004	20,963	72½	72½
1855...	33,000	27,165	72½	67½
1856...	30,000	23,740	67½	67½
1857...	28,204	27,262	70	60
1858...	31,000	24,412	65	60
1859...	13,000	3,399	1·00	65
1860...	10,000	9,488	75	65
1861...	35,000	35,995	65	45
1862...	42,000	23,747	50	45
1863...	40,531	26,014	60	50
1864...	47,489	36,927	60	60
1865...	53,000	42,469	60	60
1866...	46,550	30,287	75	60
1867...	47,000	28,853	60	60
1868...	47,728	44,506	60	60
1869...	33,811	24,415	60	60
1870...	30,077	14,240	90	60
1871...	31,686	16,339	90	75
1872...	31,621	16,780	87½	85
1873...	27,642	11,164	1·20	90
1874...	27,756	11,750	1·55	1·20
1875...	50,250	37,829	1·55	65
1876...	75,074	49,046	70	45
1877...	79,396	52,695	57½	40
1878...	63,880	41,877	47	39
1879...	73,684	62,845	45	33
1880...	59,926	46,294	45	36
1881...	60,851	45,799	41½	36½
1882...	52,732	40,417	38	35½
1883...	46,725	37,867	37¼	34
Totals...	1,357,403	972,100		

The above table is self-explanatory. The first column shows the product of all the cinnabar mines of California for a period of 34 years, and the second the total exports from California by sea and railroad, the latter first coming into use for that purpose in 1869. The other columns show the annual range of prices per pound for the article in the San Francisco market. The highest price was paid in the closing months of 1874 and the opening months of 1875. It will be noticed by reference to the product columns that the yield for 1873 and 1874 was smaller than for any previous year since 1860. This was due to the partial exhaustion of a deposit in the New Almaden, and to the gloomy outlook for silver mines about 1870. But the opening of the Crown Point and Belcher bonanza in 1870, and the California and Consolidated Virginia in 1873, stimulated the product of quicksilver, and the yield from 1875 to 1881 was unusually large. In November, 1874, a contract was made for 400 flasks of quicksilver monthly for one year at $1·50 per pound. This was probably the best contract of the kind ever made in California. The yield of the leading mines of California for the last 34 years, as compiled by Mr. Randol, is as follows:—

	Flasks.		Flasks.
New Almaden	793,859	Cloverdale	2,661
New Indria.....	125,524	Abbott	2,272
Redington	95,962	Manhattan	1,415
Sulphur Bank	73,503	Buckeye	873
Guadalupe	54,696	Mount Jackson ...	597
Great Western	48,051	Bacon	300
Napa Consolidated...	32,156	Bella Union.....	271
Pope Valley	18,097	American.....	250
Great Eastern	10,262	Porter	200
St. John	8,598	Wall-street	139
Altoona	7,527	Rattlesnake	65
Oceanic	7,391	Kentuck	55
Oakland	6,831	Various others ...	60,419
California	5,653		
Sunderland.....	2,777	Total.....	1,357,403

The New Almaden Mine has produced continuously since 1850, though some years the yield has been very light, as in 1850, 1859, 1860, and 1874, when the yearly output was respectively 7723 flasks, 1294 flasks, 7061 flasks, and 9084 flasks. The largest yield of this mine was 47,194 flasks in 1865. The product for 1883 was 29,000 flasks. It will be noticed that this mine has produced about 60 per cent. of all the entire yield of the California mines since 1850. The yearly product of the New Idria was not kept distinct until 1866. The mine was opened in 1858, and from that time to 1866 the gross yield was 17,455 flasks. This quantity is included under the head of various mines; but, if added where it belongs, would increase the product of the New Idria to 139,979 flasks from 1858 to 1883. The largest annual yield of this mine was 12,180 flasks in 1868. For the past ten years the largest yield was 8432 flasks in 1875 and 1636 flasks in 1883. The Redington Mine began producing in 1862, and its largest output was 9379 flasks in 1877. The Sulphur Banks began producing in 1874; its largest product was 11,152 flasks in 1881. The yield for 1883 was 2612 flasks. The estimated product of the Guadalupe Mine prior to 1875 is 20,000 flasks, included in the credits to various mines. Added to the total since 1875, it makes the gross yield 74,696 flasks, of which 15,540 were produced in 1879, and only 84 in 1883. The Great Western began producing in 1873, and the Napa commenced in 1876. The largest yield of the former was 6442 flasks in 1880, and of the latter 6842 flasks in 1882. Last year the Great Western produced 3869 flasks, and the Napa Consolidated 5890. The Pope Valley produced 800 flasks in 1864, then lay idle for three years. In 1868 work was resumed and continued until 1880, when it was finally suspended; the largest yield was 1955 flasks in 1873. The Great Eastern has been producing since 1875, the heaviest yield being 2124 flasks in 1882. The St. John was operated from 1874 to 1879; but there was no return for 1878. The yield was quite regular for the five years of production. The Altoona produced about 1000 flasks before 1875, which was added to various mines; it was worked continuously from 1875 to 1880, but has not furnished a flask since. The Oceanic, Oakland, California, Sunderland, Cloverdale, and Abbott began producing in 1876, and yielded from three to five years, and then stopped altogether. The Manhattan is supposed to have produced 3594 flasks prior to 1876, but nothing since 1877. The product of the Buckeye, Bacon, and Porter was for 1876 and 1877; the product of the Mount Jackson from 1875 to 1879. The Bella Union, American, and Kentuck yielded in 1876, but nothing since. The Wall-street yielded in 1875 and 1876, and the Rattlesnake in 1875. Work on these smaller mines was suspended because there was no money in the business—at the prices realised for the article, and not because the deposit of ore run out; at least this is true in most cases.

In 1876 there was probably 30 mines in California producing quicksilver. Many of these were of course experiments. The locators were unable to make any money out of the business, and so suspended operations. Out of a list of 27 mines which have produced quicksilver in the last eight years only five are known to be in operation now, according to the chart before us. These active mines are the New Almaden, New Idria, Redington, Great Western, and Napa Consolidated. The only quicksilver mines in the State that have ever paid dividends, according to the best information at hand, are the New Almaden, Redington, Great Western, and Napa Consolidated. The Quicksilver paid a dividend of 3 per cent. on preferred stock (42,913) shares, amounting to $128,139, in New York in February, the first in some time. The Redington paid a dividend of $120 per share on 1260 shares in July, 1878, making $151,200, or a total of $1,052,100 to that date. We have no record of any dividend from that mine since 1878. The Great Western commenced paying dividends in November, 1873, at the rate of 25c. per share on 50,000 shares. It has paid altogether 16 dividends, three of which were at the rate of 25c. per share. It paid no dividends in 1878, and has paid nothing since October, 1882. The 16 dividends paid aggregate $237,000. The record of the dividends of the Napa Consolidated is imperfect, because of the removal of the office to Boston. A New York paper credits the mine with having paid 30 dividends, amounting to $310,000. The last dividend was at the rate of 20c. per share, or $20,000, and was paid in November, 1883. The previous dividends were at the rate of 10c. per share. This leaves a long list of non-dividend paying quicksilver mines. At the late low price of quicksilver in London it is feared the number of producing mines here will be still further reduced unless Congress can be induced to increase the tariff. The closing of the present active mines will be a greater evil to consumers than a higher tariff to keep out all foreign supplies.—*New Almaden, May* 23. HG.

THE PRETENDED TROUBLES OF SOME BRITISH MINERS IN VENEZUELA.

"Much Ado about someone for something"

SIR,—I have read in the Supplement of last week's *Mining Journal* two letters addressed to you from Venezuela. One of these headed "Venezuelan Mining—Chile Gold Mining Company and Austin IX.," is signed A. H. Nicholson, and dated May 12; the other letter, under the heading "British Miners' Troubles in Venezuela," is not dated, and bears the signature, or rather the pseudonym, of "Guayana;" but it has appended to it a declaration by the same Mr. Nicholson certifying to the truths of Mr. "Guayana's" statements. For reasons which there is no necessity to explain I take great interest in matters concerning Venezuela, and my connections put me in a position to be well acquainted with that country, its people, institutions, and business. I have many friends established there, and many in Europe, who are largely concerned in undertakings started up or carried on in Venezuela with European capital. I believe, therefore, that you will permit me to offer some remarks on the contents of the letters to which you have granted the hospitality of your esteemed and influential paper.

Mr. Nicholson's own, or endorsed, statements in those two letters, allow me first to say, are stamped by their own reading with such unmistakeable excitement and futility that I feel sure many of your readers will be of opinion that the scorn of silence would be the best treatment to be applied to those productions. But, Sir, silence should not be kept in cases like this one, and I only break it because I am afraid that others—and they are many—who could do so with greater authority and effect may have no time, leisure, or will to take the matter up. I believe I am quite right in saying that such statements as those now published over Mr. Nicholson's signature, or, which comes to the same thing, certified by him as being true and correct, must not be allowed to pass uncontradicted, and no lover of truth and justice should permit that such statements went freely about, spreading uneasiness and anxiety in the minds of the friends and relatives of all the British subjects at present employed upon, or of the great number of persons whose capital is invested in, the mining and other enterprises of Venezuela.

Fortunately for the Venezuelans and for everybody, except, we now see, for Mr. Nicholson and a few people who may trust him, the aspersions thrown upon the public men and institutions of the Republic of Venezuela by such *factums* as those I am now taking up must have very little chance of bearing comparison with the opinion entertained of those men and institutions by thousands of trustworthy people in England and other parts of Europe and in America. None of the great number of Europeans, British, Germans, French, Italians, or North Americans, who have been for years resident in Venezuela, have ever, that I know of, found serious reasons for ever uttering complaints against the judicial or other authorities of that country. Numberless are known to be the fortunes amassed by foreigners in the pursuit of commercial and other enterprises carried on by them under the rule, and I do not hesitate to say, with the unlimited protection of the Government and institutions presided over by such men as the late President, Guzman Blanco, and by his present successor at the head of the executive authority of Venezuela. Under these high and highly respected chiefs, it has been the rule with all the members of public offices in Venezuela to protect and encourage all foreigners, and to give them every possible assistance, so long as they have remained peaceful observers of the laws and regulations, respectful of the customs and institutions of the country in which they came to seek for an honest employment of their industry. These are facts which Mr. Nicholson's statements could not succeed in denying, for they are supported by declarations as numerous as they are trustworthy.

There may be some persons who would not be convinced, and to whom it may be necessary that the inexactitude and unfairness of Mr. Nicholson's or Mr. "Guayana's" statements should be pointed out, as unavoidably resulting from a strict analysis of the tales told in the two letters sent to you by these correspondents. This I will ask your permission to do, with all due respect for the patience of your readers. In the first place we see by Mr. Nicholson's own letter that ever since February, 1883, he has acquired as his own personal property a mining concession, about the ownership of which he contends against a company formed in London—the Nacupai Company. How Mr. Nicholson came to be a mineowner in Venezuela and what of his capital it has cost him is no business of mine. What strikes me is that Mr. Nicholson, in February, 1883, had made in that country a sojourn sufficiently long for any man provided with any small amount of judgment to have formed his own opinion of the authorities and institutions to which he would have to pay respect and submission when he became a "British miner in Venezuela." In February, 1883, Mr. Nicholson, by his own present declaration, evidently found the flag of Venezuela a good and desirable protection for his industry in mining speculation for his own account. Now, in May, 1884, Mr. Nicholson is reported by correspondents, whose respectability could not be doubted, to have torn the Venezuelan flag and put it under his feet, a fact which naturally enough he avoids letting "Guayana" mention in his letter about the affray of May 9. In May, 1884, Mr. Nicholson comes to testify to the truth of statements alleging that British subjects have been "perforated by rifle bullets" when they were harmless and defenceless, which must be uneasy to believe for anyone who knows that Mr. Nicholson himself—for the good example no doubt—was in the

habit of carrying constantly a revolver in his pocket in the ordinary course of his business.

Mr. Nicholson may have to complain of some want of forbearance to him on the part of some members of the tribunals of Venezuela. Now, who could be surprised to find the indulgence of magistrates withdrawn from one who deliberately expresses in your columns, Sir, opinions which he no doubt uttered about the district there, to the effect that Venezuelan courts render "pseudo sentences not worth the paper on which they are written, although they were well paid for." In the same manner, may I ask, can Mr. Nicholson be surprised at finding the executive authorities ruling over the district where he has chosen to become a mineowner, besides being superintendent of another mine, disposed to little leniency or indulgence for him, when he thinks it suitable or convenient to endorse, as quite true, the assertion produced by Mr. "Guayana" against the Governor, who is represented—whoever will believe that—as having "ordered the Jefe Civil to arrest all parties in hiding and send them or their decapitated heads (I dot these words) to him in Guacipati." It may be just as well to mention what Mr. "Guayana" has omitted to tell, but which correspondents have stated to my knowledge, that Mr. Nicholson was one of the parties in hiding, whom the Governor wanted to be sent to him. Needless to say that he has not had his head decapitated, in this circumstance at least. I might go on thus with the statements produced by your two correspondents whose *factums* are from end to end irreconciliable with sound fairness or reasoning. But I will not tire your readers' patience, and I will only ask your permission to conclude this analysis with two more remarks. I shall, then certainly, have said quite enough to prove how little confidence may be granted to, and how little anxiety for, British subjects or interests, must be derived from the statements made by "Guayana" and Mr. Nicholson. We are told that "an unfortunate, calling himself a Corsican, was fouly murdered at Callao, the only fault he was a stranger." . . . Now, surely Mr. Nicholson ought to have been perhaps the last person to allow "Guayana" to write such a thing as this. Indeed, Mr. Nicholson should not forget—unless his head be decapitated—that he himself was first introduced in Venezuela to inspect mining properties belonging to Corsicans settled in that country. Is it possible that Mr. Nicholson should ignore the fact we all know that almost all the gold mines in the Guyana province or State have been and still are for a large share owned by Corsicans? How could a Corsican be murdered at Callao for the only fault of being a stranger? Yet Mr. Nicholson certifies to the truth of this assertion. Mr. Nicholson states in his certificate that "for many reasons that have effect in Venezuela he does not wish the names of the writers of "Guayana's" statements to appear in print." Why? What are those reasons which have effect in that country? Would it be assuming too much to suppose that the principal reason is the want of exactitude of the statements? If these are quite true, why, may I ask, do we see Mr. Nicholson standing up as the only one champion of the wrongs and claims of British subjects against the Venezuelan authorities, institutions, and people, when we are fully aware that, in the same district there are many superintendents of mines and other equally British subjects whose declarations would have certainly added to Mr. "Guayana's" statement much more substantial value, as a national grievance, than we think they have gained by Mr. Nicholson's solitary certificate of accuracy.

We are told that the British Vice-Consul at Ciudad Bolivar has begun an enquiry into the circumstances which preceded and occurred during the affray. We shall see what this enquiry will disclose, or perhaps, Mr. "Guayana" will think best not writing you about it. But I, Sir, and innumerable persons with me, are quite confident that the British Consul will find that the British miners' troubles in Venezuela, if ever they have any, are more the facts of persons committing themselves by indiscreet attitude and wanton rebellion against the laws and institutions of the country than the result of the excessive indulgence and good dispositions of the authorities and people of Venezuela so unfairly and unjustly aspersed—I have no capacity to say libelled—by these correspondents. C. W. R.

City, June 18.

VENEZUELAN MINING—THE CHILE GOLD MINING COMPANY AND AUSTIN IX.

SIR,—In last Saturday's *Mining Journal* a letter appeared from Mr. Albert H. Nicholson, superintendent of the Chile Gold Mining Company, on the subject of the concession known as Austin 9 In this letter Mr. Nicholson asserts that this concession "has been my own personal property since February, 1883." This will be news to the Chile shareholders, for they have been taught to believe that Austin 9 has become the property of the Chile Company. The directors of the Chile Company evidently think so, for, in their annual report just issued, they state that "the company has enjoyed possession for 15 months" of Austin 9. J. T.

Watling-street, June 17.

[It is customary for superintendents of Anglo-American companies to acquire and hold the property in their own name, so that they may have a *locus standi* in the courts of the country. The shareholders have no cause for fear, as they are protected by the arrangement between the superintendent and the company. The property of the St. John del Rey, the Richmond (in this case from an American legal point of view the mines belong to a local Nevada company of similar name, of which Mr. Probert is president), and of many other English companies, is similarly held. We only recollect one instance—Oxenford's case, in which Edward Oxenford ignored the jurisdiction of the English Court of Chancery as to the Emily and other mines, and succeeded in the Brazilian courts, because the directors had not the sense to proceed against him therein—in which difficulty has arisen. If Nicholson were to attempt to ignore his employers' rights the Venezuelan law and law courts would quickly see that right was done to the English capitalists.—ED. *M. J.*]

GOLD AMALGAMATION.

SIR,—In my communication last week on this subject I did little more than bring certain items scattered up and down your Journal somewhat into focus for more convenient observation. Amalgamation of the precious metals with quicksilver is a question which, as to *modus operandi*, will always have to stand on relative merit solely. Personalities, therefore, have no place in its discussion. But if a brother of mine place a stool at a crossing of highways, jump upon it and indulge in rather tall talk, he ought not, I think, to feel affronted if passers-by stop to look and listen and go on their way, talkative or otherwise.

I desire to refer to the recent 7 cwts. Oscar ore experiment with the Quicksilver-Wave Amalgamator in the extremest spirit of fairness. From his communications to your Journal it would seem that the experiment was under the conduct of Mr. Gosset, F.C.S. Having myself had a pretty extensive experience, *con amore*, in experimental work of this kind, and knowing very well that the unexpected very frequently happens just at the very time it is not wanted, Mr. Gosset's apology, therefore, for the amalgamator's disadvantage-labouring, on page 685, needs not to be taken into account, except in so far as the disadvantages enumerated might have to do in augmenting the quantity of gold found in the tailings.

Certain it is that Mr. Gosset stated 98 per cent. of the gold contained in the Oscar ore was extracted, and that, by consequence, nothing further could be desired of the amalgamator referred to. Frankly, I am obliged to say that the experiment was incomplete and somewhat unfair to the amalgamator; that is to say, if the statistics given are to be hurled indiscriminately at it, which I have no disposition to do. But as the experiment is confidently put forward as a complete success, it is open to fair criticism. In the first place, I do not think the selection of the ore for trial was appropriate. It was known to be exceptionally rich in gold, holding by owners' assay at the rate of 10¾ ozs. per ton. A more practical test, perhaps, would have been of an ore containing 10 dwts., or even less, per ton.

It seems a pity the following points were not noticed:—Whether the sieved ore contained arsenical or other pyritous minerals that are generally antagonistic to free amalgamation. Whether more than one assay of the ore was made previous to the operation; and, if more than one, by how much the assays differed, if at all. Having in view the published assays of the tailings after the operation, whether the ore before treatment was specially assayed for silver. Whether the 57 dwts. button of gold contained a high percentage of silver. Whether the operation was completed in 50 minutes as it should have been. Whether there was an appreciable loss of quicksilver in the operation; and whether any gold was accidentally driven over on distilling the quicksilver. As to the statistics, it may be assumed—That the owner's assay of the ore was approximately correct—10¾ ozs. of gold to the ton of 20 cwts. That Mr. Gosset's statement of the gold assay as being "over 10 ozs." falls appreciably short of 10¾ ozs. as per owner's assay. That the 1¾ cwt. trial yielded at the rate of 9 ozs. 2 dwts. per ton. That the 7 cwts. experiment actually yielded 2 ozs. 17 dwts., which by calculation is equivalent to 8 ozs. 2½ dwts. per ton of ore, and that unless 8 ozs. 2½ dwts. be equal to 10 ozs. 15 dwts. (as above), Mr. Gosset's calculation as to 98 per cent. of the contained gold (as per assay) cannot I think be quite correct.

As to the tailings, it cannot be assumed that the assays of the tailings coincide in the least, so that the approximate value of this refuse remains still undetermined. It is impossible to reconcile Johnson and Son's assay of 2½ dwts. of gold, and 2½ dwts. of silver to the ton of tailings, with Claudet's 6½ dwts. of gold and no silver. Obviously, nobody will entertain a doubt of the accuracy of these eminent assayers' work on the individual samples assayed; but it is equally obvious that the results produced are valueless as regards the object aimed at. If Claudet's 6½ dwts. of gold be right, a probability of error rests with Johnson and Son, who make their's exactly one-half silver. If the 6½ dwts. of gold per ton left in the tailings (as per Claudet) be added to the 8 ozs. 2½ dwts., we have 8 ozs. 9 dwts. as the total of gold contained in the ore per ton, which weight appears to be just 13 dwts. per ton less than the yield of the 1¾ cwt. trial; and 26 dwts. less than the assay value prior to the operation. But if 8 ozs. 2½ dwts be taken from 10 ozs. 15 dwts., we find that the assay value of the ore was not reached in the yield by 2 ozs. 12½ dwts. per ton; and yet it is stated that 98 per cent. of the assay value was extracted by the operation.

An important question arises here—supposing only 6½ dwts. of gold altogether in a ton of ore containing auriferous arsenides to be operated on, what proportion of it would be left in the tailings? For if Claudet's assay be correct, the amalgamator failed to extract all the gold by that much. It is asserted with some probability as to accuracy, that there is a natural alloy of gold and silver of equal proportions that will not amalgamate with quicksilver; such an alloy could hardly be in the tailings in question, or Claudet stood a chance of getting some of it as well as Johnson and Son.

Touching the matter in question, I may seem to some to be making "much ado about nothing;" but it is not really so. Either the matter is of importance, or it is not. If of importance, it has to be critically investigated. I am not finding fault with the assayers, though assayers do not account themselves infallible. I am not finding fault with the amalgamator referred to either; for I am about to become its apologist somewhat. It has been badly treated: for its advocates all along have proclaimed for it more than it can under all circumstances possibly perform, and, as I have before written, it is not necessary that it should do anything like what it is said to be capable of, in order to prove its superiority; but when its advocates publish that it will secure "25 to 35 per cent. more gold than any amalgamating process now in use," it is obvious that they have not thought out carefully what they say in this respect, for they cannot possibly tell what percentages all other amalgamators are securing.

The figures as I have put them seem to strike death to the amalgamator; but in reality they do not. I happen to be heterodox enough to disbelieve in the possibility of obtaining "a fair sample" of gold ore in bulk, particularly when it is comparatively poor in gold. Fair sampling of such ore can never pass muster as anything more than indiscriminate selection. Judgment has the least possible to do with it. Neither mineralogical nor chemical knowledge helps in the matter. As to the interesting and sometimes charming operation of making an ordinary gold assay, anybody who has come to years of discretion can do that more or less expertly. Let us first get a sample to operate on, say a stone weighing 56 lbs., holding gold very unequally disseminated. Crush this, grind it never so fine. Pass it through sieves, a dozen times, if willing, and take out the coarse gold if any. Take the sieved stuff and make its dust-particles change places a million of times if you can by tossing and pushing it about for the purpose of intermixture. Now, let us suppose it to contain at the appreciable rate of 240 grains of gold as fine as flour, and perhaps finer, to the conventional ton. Six grains of gold in all are in the 56 lbs. of ore. How is it possible to disperse this equally throughout the mass and to take 1-1800th part of it for assay to represent the gold in the bulk? A dozen assays would be better. Two dozen would be better still.

But who thinks of having gold assays made by the dozen for such a purpose? Assays for the baser metals are made by the dozen, and advisedly so. Gold ore, most assuredly, should be treated with equal care. It is quite possible that the one assay of the Oscar ore referred to above was in excess of what the bulk held. To my mind it was not a fair standard to judge from, and, therefore, not a fair trial of the amalgamator; and the pity is whatever its true measure of superiority may be that it should be over-ridden by exaggeration in any way.

That ordinary quicksilver will always take up gold contained in pyritous minerals to the extent of their highest assay value is not to be expected, even supposing the assay test can be relied on as perfect in every respect. I have myself obtained, and have known others to obtain, gold by amalgamation of value far exceeding the previous assay tests of the ores treated. The simple explanation of this is the assay tests as made were of no practical use.

On the other hand, about a year ago, 20 tons of quartz was sent to London from Africa in 500 bags. This was crushed and "fairly sampled," a pound weight selected therefrom, and an assay made thereof, resulting in nearly an ounce of gold per ton. To call this "fair sampling" is simply absurd. The bulk was afterwards sent to me for treatment by my process. The owners, I believe, never had access to these bags, from beginning to end, and they were desirous of securing the whole of the contained gold, and they got it. There was, however, somebody who desired the non-success of my process, so introduced a peck or two of palm nut kernels, &c., amongst the ore to be treated. The African agent who selected the ore said the assay was wrong, and 4 ozs. or more to the ton ought to come out of it. But to the disappointment of everybody concerned, I fancy, the total yield was only about 10 ozs. That this was a true result was confirmed by no gold being left in the tailings after repeated assays. Whilst being of opinion that the 7 cwts. operation was no practical test of Mr. Moon's amalgamator, I am also of opinion that the conflicting data published thereupon do not in the least militate against the probable usefulness of it. The test I think should be upon ore comparatively poor in gold; and associated with arsenides and other deviltry antagonistic to the free amalgamation with pure quicksilver, which was the original proposition.

London, June 16. T. A. READWIN, F.G.S.

ROYAL UNIVERSITY OF MINING AND SCIENCE.

SIR,—The *Mining Journal* can certainly do very much to improve mining in England in every way; but the Editor will find it a most difficult task, considering the interests that have to be conciliated. As an Associate of the Royal School of Mines I am disposed to say something on the question of creating a Science University in England, but I have hesitated to do so because, as regards the School of Mines, I fear my views would not meet yours on the subject. The School of Mines was "affiliated" in 1881 to the Normal School of Science as the result of what many regarded as an intrigue to place Prof. Huxley in the position formerly occupied by Percy and Smyth. The result is that the instruction, &c., is now under the supreme direction of the eminent biologist, and that the matter of the lectures is selected with a view to the wants of "science teachers." In all other civilised countries the tendency is to specialise more and more the direction and instruction of mining schools, and in view of the rapid augmentation of available material in every science it becomes yearly more necessary to select in each the matter and treatment best adapted to special students. One might easily imagine a course of lectures on geology admirably suited to science teachers, and utterly useless to miners, and the same in chemistry, and most of the other subjects bearing on mining. Moreover, the practical result of the "science teacher" scheme is to turn out men who have received at Government expense a general smattering of science, and who then underbid for the precise work which would otherwise be done by regularly trained experts, and through their ignorance, want of previous education, and consequent self-confidence, bring scientific training into contempt.

The only remedy that I can suppose practicable would be the wholesale transference of the School of Mines to Cornwall. That would not cost much, and would offer advantages that need hardly be enumerated. The lectures to working men, &c., would then be of real use, and working miners with sufficient energy could make their way with every advantage. I need hardly add that biology would be entirely excluded, as in all schools of mines, and because biology must be replaced by more essential subjects it does not follow that the School of Mines must be "affiliated" to an institution in which biology reigns supreme. In Cornwall everything could be subordinated to mining and metallurgy, and placed under the direction of some person possessing at least some knowledge of the subjects for which the School was intended. Unless some such change is effected there are certainly bad days in store for British mining, and Germans will soon entirely supersede English miners on the Continent, and possibly even in England. Yet German mining would long since have gone to the bad but for the wise interference of the German Governments.

The most imperfect accommodation in Cornwall would be better than the best in London. Highly organised laboratories and costly museums and fine libraries are worse than useless to a mining student. An efficient institution could be provided at small expense, and the Government would doubtless agree to transfer the existing privileges of the School of Mines. But any efficient provision for the training of practical mining engineers would be against the interests of those who promote bubble companies and water the capital of new mines. They require a supply of men who can conscientiously write utter nonsense regarding the probable results of working a mine bought for something like its true value, and floated at many times that amount. Properly trained mining engineers could not do that work, consequently I doubt if any movement in favour of a good mining school would receive much support; the working miners, the smelters, the machine makers, and the *bona fide* investor would have most to gain by it.—*June* 11. SCOTIA.

ROYAL UNIVERSITY OF MINING AND SCIENCE.

SIR,—I saw your suggestion about science degrees, which is very good so far, but you will never carry it in the way you hope; there are too many conflicting interests, and you offer them nothing by way of compensation. I acknowledge that you can stick to anything you take up and often succeed, but often in this case means just nothing at all. One of your correspondents last week quoted something Punch said against Cornishmen; let me then quote him against yourself. You remember the Irish butler's master who would not strain a point to say the man was sober, and the butler asked if he would kindly say he was sometimes sober? Now are not not attempting what will show your weakness just as much—you will have to ask for a character hereafter that you sometimes succeed. You are sure to have your own notions as to what your Science University must and may be right in theory but in practice—you advocate practice—you must get Huxley's views, Percy's views, Smyth's views, and the views of existing university bodies, and science college bodies to agree with yours—impossible! Try the first two to begin with, and if you get the President of the Royal Society, Dr. Percy, and the editor of the *Mining Journal*—three of about as intractable individuals as are to be found in the kingdom—to work harmoniously together I will throw in the others and call myself beaten. For myself I have nothing to do with the Royal School of Mines, but why should I, because I happened to study in the Dublin School of Science, be left out in the cold. We turn out men quite as good at Dublin as they do at South Kensington, and our men make better miners; if that were not true I would be studying in London instead of here, but the price here is within the means of men to whom the science they teach us is useful. No man can be made a mining engineer either in Dublin or London, but he can be taught as much as he can learn in any school. In fact there is now no School of Mines in London except in name, and such instruction as the mining engineer requires is not afforded at South Kensington at all; both Leeds and Birmingham are now much in advance of London in working mining subjects, and they have better professors; it may be because they are not so well paid, and are therefore obliged to make themselves popular and useful. Let us have a Science University by all means, but not on the South Kensington lines.—*Dublin, June* 16. MORA.

TREATMENT OF GOLD AND SILVER ORES BY ELECTRICITY.

SIR,—My attention has been called to an article in the *Mining Journal* of June 7, signed "Translator." The manifest fairness in which your contributor treats the whole question of electro-amalgamation induces me to address you thereon, especially now that they are talking of "a gold famine" in Victoria, and inviting people to go and treat their sulphurets. For the sake of argument we will admit that the results given by "Translator" are substantially correct, then comes the question who is at fault, or rather where is the error and the remedy? I venture to assert a deficiency of electro-magnetic force is the sole cause of the results not being equally satisfactory in both cases. In my early days I was a warm advocate of Mr. Evan Hopkins' theory of terrestrial magnetism, which he so ably explained in the *Mining Journal* some years ago. Mr. Hopkins argued that metals have been deposited by electricity; in my mining experience, extending over a quarter of a century, in various parts of the globe, I have always found Mr. Hopkins' theory confirmed. The Devon Great Consols, the once celebrated Burra Burra, and the Kapunda Mines are all cases in point.

I know of no case where compound ores of gold or silver do not conform to the general law of Nature. "Translator" must remember that Nature may have taken ages to accomplish by a low constant current what we wish to effect in a few minutes, therefore what we lose in time must be equallised by additional power. In all metallurgical operations it is a question of affinities, whether you are treating hematites or oolitic ores of iron, copper, lead, tin, or other metals. Most metals exist in some combined state either chemical, mechanical, or both; this natural combination must be destroyed before we can expect to be successful in substituting an artificial one.

So in the case of sulphurets combined with gold and silver; that combination must be destroyed before we can look for successful amalgamation. My experience has received important and valuable confirmation at the hands of Professor Ayrton, F.R.S., and Mr. John Perry, M.E., in their published reports on sulphurets carrying gold. They state:—"It is, therefore, quite certain that specimens of pyrites, from which all free gold has been extracted, and from which the remaining gold cannot possibly be extracted by ordinary amalgamation, will, however, yield up a considerable amount of gold to mercury, if a positive current be passed from the water through the pyrites to the mercury. Our experiments show that the amalgamation that takes place arises from the chemical action produced in the pyrites by the passage of the current."

The high repute in which these gentlemen are held in electrical science in this country will entitle their investigations to the confidence of your readers. It then becomes a question of electro-magnetic force; in some cases a limited number of bolts are ample, whereas in others it may be necessary to use a current of much greater power, keeping the ore under treatment for a longer period of time. This has been clearly demonstrated by my electro-mercurial bath, which probably "Translator" has not seen. In a trial of Australian sulphurets over the Riffle table with a current of low electro magnetic force the loss was uniform; but on treating the same ore in the mercurial bath a gain of 1 oz. of gold per ton was at once established. Referring to the interesting researches of Mr. Robert Schelle, Royal Hungarian analyst, quoted by your correspondent, I arrived at precisely

the same result twelve months ago, and can explain this point thus—with a stationary anodi placed across a basin the ore was driven into two heaps as far apart as it was possible for the electricity to separate them. The consequent result was that the electricity took the shortest possible course to the negative pole, which was the mercury, without going through the ore from Franz's shaft. This difficulty was overcome by the use of revolving anodes, which kept the ore in constant motion.

Electro-amalgamation is only in its infancy, and its future progress will depend upon the knowledge, experience, and skill that is brought to bear on it. I will remind "Translator" that if one of the "greyhounds of the Atlantic" made the attempt to cross that ocean with a motive-power of the Bolton and Watt era the passage would not be made in the conventional seven days. Again, turn to our railways, where would poor Puffing Billy be alongside one of the large locomotives of the present day with a speed of 50 to 60 miles per hour? Again, in cases of steep gradients, on our mineral lines—say, 1 in 50, where for heavy traffic a pressure on the boiler of 156 lbs. per square inch is required to move the load. "Translator" would find it difficult to move the same if his boiler strength was limited to a pressure of 50 lbs. per square inch. I adduce these parallel instances in other industries to show "Translator" that he must not look for perfection all at once. It is but a step from electro-amalgamation to electro-chemical decomposition of compound ores of gold and silver, and it is in the latter line that the patent commands such a large field.

To treat successfully the ores to which "Translator" refers, the electro-magnetic force should be increased sufficiently to free the gold and silver from their normal compounds before successful electro-amalgamation can be accomplished.

London, June 13. RICHARD BARKER, M.E.,
Patentee of Electro-Amalgamator.

THE HARROWBARROW DISTRICT.

SIR,—From private information which has reached me from some of the old tributers working on the silver zone or belt at Harrowbarrow, there is a fine prospect of an abundance, not only of lead, copper, and mundic, but, above all, of that which is so rare in these days—real silver ores. Everyone ought to wish these old tributers success, and they should be encouraged by the captains as much as possible; but, on the other hand, much care must be taken in working a real silver mine that they do not get too much. As there is some difficulty in this, I will mention that there is no better person to be consulted on this subject than Capt. Knott, who has long been looked up to as the best practical silver miner in the district.

Exeter, June 19. E. T. M.

FOREIGN MINING AND METALLURGY.

The groups of the Sambre and the Escant have just officially carried the price of iron to 6*l.* 8s. per ton, but this has not prevented Parisian iron merchants from continuing to do business at 6*l.* 4s. per ton. We learn that the Denain Works have just obtained an order for steel-plates for a frigate in course of construction at Havre. The Société des Forges et Chantiers de la Méditerranée has also received from Japan an order for a frigate, which is to cost altogether 240,000*l.* The Orleans Railway Company is about to let an important contract for goods trucks. A similar order is also expected to be given out shortly by the Southern of France Railway Company. The production of pig in France is divided between 33 departments, but last year 69 per cent. of the production was effected in five departments—Meurthe-et-Moselle, 716,000 tons; Nord, 255,000 tons; Sosne et Loire, 178,000 tons; Gard, 145,000 tons; and Ardèche, 103,000 tons. The condition of the German iron trade has not much changed, and little variation is anticipated in the situation until the close of the summer. Prices are certainly very low, but it seems that the proprietors of works will be pretty well satisfied if no fresh fall occurs in prices. The production of pig in Germany in April is returned at 302,828 tons, as compared with 279,706 tons in April, 1883.

The condition of the Belgian Iron Trade has not materially changed, and no improvement is expected to be witnessed in it for some time. Clients appear to have little confidence in the future, and so long as this is the case orders will be scarce. If anything, the change in the situation has been for the worse rather than otherwise, as the very duration of the crisis aggravates its gravity. At the same time, the current of orders, very reduced it is true, is sufficiently strong to secure employment to the works from day to day, while some establishments have even contracts for a week or two in advance. We refer especially to ordinary rolling mills having no specialities, either for plates or girders, &c. The construction workshops begin to find themselves rather without orders, especially the smaller establishments. Prices have not experienced any material variation in the Belgian iron trade. Hard refining pig has made 2*l.* 0s. 10d. per ton, while ordinary pig has brought 1*l.* 16s. 10d. per ton, and mixed pig 1*l.* 12s. 10d. per ton. English casting pig has ranged between 2*l.* 2s. 9d. and 2*l.* 3s. 2d. per ton. No. 1 iron has sold at 4*l.* 12s. per ton for exportation, but in small transactions 2s. to 4s. per ton more money has been asked. No. 2 has made 4*l.* 18s. per ton, while No. 3 has brought 5*l.* 4s. per ton. No. 2 plates have brought their old price of 6*l.* 4s. per ton. No. 3 making 7*l.* per ton, and plates of commerce, 8*l.* 12s. per ton.

Prices have not experienced any important change in the Belgian Coal Trade. In the Couchant de Mons quotations have been firm in consequence of a decline in stocks. The imports of coal into Belgium in the first four months of this year amounted to 389,298 tons, as compared with 387,250 tons in the corresponding period of 1883. In the total of 389,298 tons English coal figured for 80,910 tons, German for 154,682 tons, French for 29,292 tons, Dutch for 124,407 tons, and coal from other countries for 7 tons. The imports of coke into Belgium in the first four months of this year were 13,922 tons, as compared with 8300 tons in the corresponding period of 1883. The exports of coal from Belgium in the first four months of this year were 1,481,685 tons, as compared with 1,277,898 tons in the corresponding period of 1883. In the total of 1,481,685 the exports of coal to France figured for 1,403,823 tons, while the Low Countries took 36,962 tons, and other countries 40,900 tons. The tone of the German coal trade has continued pretty good, thanks to the continued development of the exports; but no improvement has at present taken place in prices. A syndicate formed for securing a diminution in ore production does not appear at present to have secured a sufficient number of adherents to give its proceedings the force of law. Meanwhile the German collieries must be said to be well employed. The daily average deliveries of coal over the lines accommodating the basin of the Ruhr were 7892 tons in the second half of May, as compared with 7833 tons in the corresponding period of 1883.

THE SYDNEY MINT.—The Sydney Mint, the first branch of Her Majesty's Mint established in the colonies, has been in operation for more than 26 years. It was granted on a petition from the Legislature of New South Wales, forwarded by Governor Fitz Roy in 1852, and was authorised by Order in Council on Aug. 19, 1853, and opened for the receipt and coinage of gold on May 14, 1855. It is maintained under the provisions of the Sydney Mint Act of 1865, from a special appropriation of a sum not exceeding 15,000*l.* a year out of the Consolidated Revenue, and is under the immediate control of the Lords Commissioners of Her Majesty's Treasury. The coinage is in gold, and consists of British sovereigns and half-sovereigns, which are in all respects like those issued from the Royal Mint in London, with the exception of having a small S impressed on the face as a distinguishing mark. Silver and bronze coins are kept in store, and are issued at their nominal value under regulations approved by the Governor, the cost of transit from the London Mint being defrayed by the Imperial Government. Worn British silver coin is also received in exchange for cash, and is melted and sent to London for recoinage on account of the Royal Mint. From the opening of the Mint to the end of 1881 the receipts of gold for coinage have amounted to 13,003,282 ozs., of the value of 49,663,110*l.*, more than half of which was the produce of the gold fields of New South Wales. The issues during the same period have been 44,692,500*l.* in sovereigns, and 2,144,500 in half-sovereigns, besides 2,268,194*l.* in gold bullion, principally for shipment. Grand total 49,105,194*l.* New silver coin to the amount of 131,800*l.*, and 19,900*l.*, in bronze coin, have also been issued, and 76,749*l.* in worn silver coin withdrawn from circulation in the Colony.

MINING IN NOVA SCOTIA—THE SALMON RIVER GOLD MINE.—Judgment has been given by Judge Thompson in favour of Messrs. Mott and others confirming them in possession of this valuable property. It is rumoured that the plaintiffs intend taking out an appeal, but the general opinion among mining men is that the matter had better be allowed to rest as it is. There is a feeling that this decision will benefit our mining interests by putting mining claims on a more secure basis than heretofore, and that thus investors from abroad will be more ready to put their money into our mines. The Salmon River Gold Mining Company of Nova Scotia has just added eight more stamps to its mill, increasing the number now running to 43 stamps. This company started about three years ago with five stamps, and has been steadily increasing its crushing power as the mine has developed. The main vein is from 3½ to 9 ft. in width, and mills from $10 to $100 per ton; the cost of mining and milling is $2·50 per ton. All machinery is driven by water-power. Some five years since a prospector discovered in the Cariboo district, Moose River, a number of boulders that gave indications of coming from some rich lode in the vicinity. He proposed calling the lode, when it should be discovered, the Lake lode. Search has been carried on more or less vigorously, but persistently, during the intervening period, but without success till a few days since, when it was found. The surface indications are that it will yield at 2 ozs. to the ton of ore. Mr. William Bruce, the lessee of Mr. Touquoy's mine at Moose River, Cariboo, came to Halifax on May 12, bringing with him a brick of gold from that mine weighing 49 ozs., and valued at $930. It was the result of the work of seven men during April, and was extracted from about 60 tons of ore.

— *Halifax New Era.*

MINERAL RESOURCES OF IRELAND—ARGENTIFEROUS GALENITIC BLENDE.—At the meeting of the Royal Dublin Society, on Monday (Rev. M. H. Close, M.A., in the chair) Prof. C. R. C. TICHBORNE, in an interesting paper "On An Argentiferous Galenitic Blende found at Ovoca," said he wished to bring under notice a mineral of which very little was known, and also to offer some speculations upon its general character. It was found in the east district of Ovoca, and called there "Kilmacovite," from the name of the place where found. There could be little doubt that this mineral was identical with one which had been discovered in the Island of Anglesea, and was called by the miners there "bluestone." An analysis has been performed which showed that this mineral contained 25 per cent. of zinc, 25 per cent. of lead, and about 8 ozs. of silver per ton. It had been examined by the spectroscope for the rarer metals, but no indication of these substances could be found. This ore compared very favourably with the important ones of Europe and America, as shown by a table given by the writer. The writer objected to the terms which had been applied to this mineral on the grounds that they were too local, and did not describe the ore. The author explained his method of determining the actual physical as well as the chemical composition of the ore. In conclusion, he said that he was tempted to quote from his report upon the Dublin International Exhibition of 1865 in connection with the raising of silver in Ireland. At that time he found that this country was a large supplier of silver, but he was almost afraid to make the calculation now that he then made of the silver supplied by Ireland. He then stated that Ireland yielded 14,000 ozs. of silver per annum, or 2·4 per cent. of the whole of the silver raised in the world, and its value might be estimated at 3850*l.* per annum, exclusive of the accompanying lead. If 1000 tons of this ore could be supplied, which represented of silver alone 8000 ozs., how lamentable it seemed that this valuable industrial resource should remain unworked.

MINERALS OF NEW SOUTH WALES.

As it is not always an easy matter to get access to Colonial Government Reports relating to the mineral industry of a district such books as that of Mr. ALFRED SWINNEY—The Collieries, Coal Fields, and Minerals of New South Wales, Australia. By ALFRED J. G. SWINNEY. London: Colliery Guardian Office, Essex-street—are of considerable utility as well as interest. The details given are it seems compiled from notes actually taken by the author during a residence of several years in the colony, and as he is professionally connected with colliery and other mining operations no one should be better able to determine what facts are likely to be most required. In the chapter on coal Mr. Swinney gives the statistics for 1879, and particulars of some of the principal seams then worked, elucidating them by means of a good sketch map, transverse sections showing how the formations succeed each other and what fossils are met with, and vertical sections showing the valuable and valueless strata passed through in various pits. He states that the mineral lands in New South Wales can be obtained on very easy terms. The greater portion is barren, and unfit for either agricultural or pastoral purposes, and, consequently, its whole value to a buyer is the minerals it contains. The price of freehold land varies in different localities, but 5*l.* per acre may be taken as the average price for which coal land can be bought. Crown land can also be taken up for mining purposes, either on a 20 years' lease, or conditionally purchased. The limit is 640 acres, rental 5s. per acre per annum, and the lessee must expend within the first three years of his lease 5*l.* per acre on his lot. The price of Crown land conditionally purchased is 2*l.* per acre for lots not exceeding 640 acres; the amount is payable 10s. on application, and the balance within five years, within which time it must be improved to the extent of 2*l.* per acre.

The chapter on iron is much enhanced in value by the insertion of many analyses of the mineral wrought. The chapter on tin is brought down to 1880, whilst those on copper, silver and lead, and gold are brought still later, extending to 1881. It is true that later statistics have been given in the *Mining Journal*, but these the Editor had not the advantage of collecting on the spot, nor could he give them the years of careful consideration which Mr. Swinney has given his. On the whole the book is well worth reading and study, and is likely to lead to increased attention being given to the minerals of the colony by the capitalists of Great Britain, as Mr. Swinney shows that there is a large field for remunerative enterprise.

TELEGRAPHY.

The applications of electricity are now so numerous that it has become quite impracticable to deal with the entire subject in a single treatise without rendering the whole confused and uninteresting to the student. In the volume now under consideration—Telegraphy—By W. H. PREECE, F.R.S., M.I.C.E., and J. SIEVEWRIGHT, M.A., C.M.G. London: Longmans—the authors have taken up one important application of electricity, and treated of it ably and exhaustively, so far as a treatise specially designed for artizans and students in science schools can be exhaustive. The reader is led step by step to a knowledge of the various details of practice without being required to possess any outside scientific or mathematical knowledge. The volume having already reached its third edition its general character is very widely known, yet a repetition of its arrangement and contents will not be out of place. In the chapter on electrical terms the lucid manner in which potential, electro-motive force, and resistance are explained greatly lightens the student's subsequent labour in comprehending the facts stated with regard to batteries, signalling instruments, circuits, special telegraphy, and construction dealt with in the six succeeding chapters.

The chapter on faults is a particularly valuable one, disconnections, earths, and contacts being separately dealt with, and each being considered according as the defect is total, partial, or intermittent; so faults in the battery, faults in the instrument, faults on the line, faults in underground wires, and faults due to lightning are all specially referred to and the probable cause of them is carefully explained. In connection with faults on the line one remark is made—and as several years have elapsed since the book was first published it cannot be contended that it was written with any view of opposing the overhead wires now so much objected to—which seems to show that the Post Office authorities have always recognised the objectionable character of this mode of carrying the wires. After explaining the best method of carrying the line past trees it is said:—The wires should be doubly bound and soldered at each insulator so as to prevent their running back, and thus to reduce to a minimum the danger so likely to arise from a broken wire. In the remaining chapters testing is very carefully treated of, as are telephones, fast repeaters, and quadruplex telegraphy. There is a good table, showing the areas of cross section of round wire, imperial standard wire gauge, and resistance, conductivity, and weight for copper and iron wire. The volume is in every respect calculated to meet the wants of those for whom it is written.

REPORT FROM CORNWALL.

June 19.—Mining affairs have continued in a very quiescent, but still in a hopeful state, though the hope is founded rather upon general impressions than upon any direct indications. More than that it would be difficult to say; and, of course, there are many to whom prospects of any improvement seem doubtful. In any case, however, we should not advise the parting with shares in mines that display any promise; while capital for investment is so limited that there are many likely bargains to be picked up by those who may not be in too much of a hurry to realise.

At the last meeting of the Redruth Board of Guardians, the clerk (Mr. T. C. Peter) reported that he had been in communication with Mr. Marrack, solicitor, of Truro, representing the Dolcoath adventurers, with regard to the proposed assessment of the 25,000*l.* "fine" recently paid to Mr. Basset, and that gentleman had expressed his willingness to refer the matter to arbitration instead of going to the expense of an appeal before the Quarter Sessions, suggesting Mr. T. S. Bolitho, of Penzance, as the arbitrator. The Assessment Committee decided to recommend the adoption of this course, and asked the board to confirm their decision. Objection was raised to Mr. Bolitho, as a holder of 20 shares in the mine; but it was pointed out that Mr. Bolitho held such a position in the country that the matter would be perfectly safe in his hands, and he might be trusted to decide (calling in professional advice as to any legal points) the question impartially. The recommendation of the committee was, therefore adopted, and the clerk was instructed to draw up his case and to lay it before the committee. No doubt the matter could not be in better hands; but still we retain our doubts as to the wisdom of the arrangement. The Dolcoath adventurers can bind themselves; but we are very much mistaken if the rating authority can. In what position would the question be if the decision is in favour of the mine—as we hope and believe it must be—and any ratepayer chose to reopen the whole controversy by refusing to pay his rates on the ground of the omission of Dolcoath fine assessment? Half measures under one-sided conditions are never safe.

The *tu quoque*, or "you're another," style of argument is never a very satisfactory manner of dealing with any question important in practice or principle. For this reason there is no need for us to impart into the controversy raised concerning mining education any references to our own experiences in the colliery districts of the North, Wales, or the Midlands (the true locality of Punch's "'eave 'arf a brick,") or to the patent fact that Sheffield is not the best school in the world to teach the working classes either good manners or fair-play. These matters have really no bearing upon the true points in issue. Nor is it much more to the purpose to assert without proof that the miners of Cornwall are "like the Irish," and work best out of their own country—a double suggestion which neither Cornish nor Irish will adopt. Again, seeing that strikes and their attendant evils have been all but unknown in Cornwall, and that the much-talked of and little understood "Camborne riots" had their origin in the instinct of self-defence, and the natural desire to retaliate upon cowardly rascality—references to these things also are equally wide of the mark.

There are a few patent facts, however, which may help to solve the problems propounded. One is, that Cornwall (and we, of course, include here the mining districts of Devon) is the chief centre of metalliferous mining in the kingdom, and the only place where it can be practically studied in all its phases. Another is, that whatever may be said of Cornish miners at home (and they are at least as religious and orderly and capable as any of their fellows), it is to Cornwall that the leaders of mining enterprise in every part of the world go for their best men. This much may be admitted, that they are rather prone to adhere to old ways at home; but, on the other hand, no men have ever shown themselves more fruitful of resources in grappling with new situations, and no class of men in their degree have been more inventive and more capable of carrying difficult works through without extraneous aid.

And as to the question of scientific training, we wonder whether it is or it is not a fact that the Cornish mines have produced the most notable body of mining engineers the world has ever seen—such men (to speak only of the dead) as Trevithick, Woolf, Hornblower, West, and Hocking, and many others who could be named; and, more or less directly, such lights of science as Davy and Henwood, Fox, Williams, and Borlase—all named simply by way of illustration; and, while it may be admitted that in Cornwall, as in every county in England, and in mining, as in every industry in the kingdom, there has been a certain amount of friction between the investigators and the workers—the so-called "theorists" and the so-called "practicals," who have looked at matters from a too one-sided point of view—is it in any way right to charge the county with neglect of the scientific and educational element, knowing how it has struggled, in spite of all adversities, to help itself? The Royal Cornwall Geological Society is the oldest provincial geological society in the kingdom, and has done excellent work. The Royal Cornwall Polytechnic is the real pioneer of all the efforts that have been made in the past half century to stimulate invention and improve mechanical operations by exhibitions. The Miners' Association was founded for no other purpose than to improve the capacity and practical status of the miner. At the present moment its highest awards go only to the actual workers underground; and it has really done marvels with the smallest of means, while its pupils are to be found in positions of trust and importance in every part of the world. The Mining Institute, again, has no other object than that of forwarding the interests of mining generally, and it, too, has done, and is doing, good work.

In the face of facts like these it is idle, or worse, to talk of mining education having been neglected in this county. Cornwall has done its part, and the real neglect has been elsewhere. When many years ago another honoured Cornishman—Sir Charles Lemon—tried to work in this direction, and established the Mining School with which the Royal Institution of Cornwall was associated, it only needed a little aid from the nation—not a tithe of that which is now given to the Royal School of Mines—to have founded in Cornwall a Mining College, which would have been one of the greatest boons possible to the practical industry of the nation. But the opportunity was allowed to slip, and we are now only talking about what ought long since to have been done.

That something more is needed is certain, and it will be best that the whole subject be thoroughly thrashed out. For that reason we prefer for the time to leave the question where it is, having cleared the ground of some of the most extraordinary misconceptions of which we have ever known outsiders guilty, even in matters of Cornish mining. We simply add that there would be no practical difficulty whatever in the way of training students at the leading mines—at least there never has been any difficulty yet in the admission to them of young men from any part of the world who have desired information on mining affairs, including several Japanese. As to titles, they will be valued precisely for what they mean; and should not be conferred save under the strictest guarantees of efficiency.

INCE HALL COAL AND CANNEL COMPANY.—Resolutions having been passed for the voluntary winding-up of this company, an order was made by Mr. Justice Chitty, in the Chancery Division of the High Court of Justice, upon a creditor's petition for the voluntary winding-up to be continued, under the supervision of the Court.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

June 19.—The annual meeting of the Chesterfield and Derbyshire Institute of Mining and Mechanical Engineers, which takes place on Thursday next, is looked forward to with a good deal of interest, seeing that at it the question of amalgamation with the Midland Institute of Mining Engineers, which has its head-quarters at Barnsley, is to be settled. The Midland is by far the oldest of the two, but certainly not the most successful from a financial point of view. There is, however, but little doubt that the amalgamation will be agreed to, and that in the future the combined Association will be located in rooms specially set apart for the purpose, in the Firth College, Sheffield. The Stephenson Hall, in Chesterfield, it may be said, was erected principally through the efforts of the Derbyshire engineers, who had rooms in the building, and many regret that they are leaving the old place with which they have been connected, associated as it is with the name of the greatest of modern engineers, and who was the man more than any other that led to the opening out of the vast and valuable deposits of coal that find employment for many thousands of miners in Derbyshire.

Considering the season, the house coal trade in Derbyshire has been tolerably good; but it does not allow of the men working much more than an average of four days. Several of the collieries have done very fairly with the Metropolis, to some extent due to the rate being lower than for some other districts; and the rate, it may be said, has a good deal to do with the London coal trade, especially in the summer months. A considerable tonnage of steam coal is required for the local ironworks, whilst there are several contracts for the supply of railway companies, and there are two important sources for the consumption of this description of fuel, for not much of it is sent away for shipment, only a few collieries being in a position to send direct to a seaport. A moderate tonnage is sent to London, where some of it is sold as low as 18s. a ton, and contracted for in bulk, to be delivered at rather less than 17s. This, it need scarcely be said, leaves no profit whatever to the colliery proprietor, and in not a few instances, causes considerable loss.

Not much is doing in gas coal, although there are several contracts in hand, and a moderate business only is being done in engine coal. In pig-iron there has for some time past been a regular production that is fully sufficient to meet the local requirements and the demand for other districts, and this is done by keeping a good many furnaces out of blast, otherwise there would be heavy stocks. Some of the large foundries consume a heavy tonnage of pig, as they are turning out large quantities of gas and water pipes, as well as other kinds of heavy castings.

In Sheffield some few branches are looking somewhat better, but the trade generally is anything but brisk, and many workmen are still but partially employed. In Bessemer, since the holidays, more has been turned out and gone to the rail mills, but this department is still comparatively dull, as the makers are not able to contract for foreign orders with those who have so much less to pay for carriage. Springs, axles, and ordinary railway material are in steady demand, and some fair orders are in hand for steel wire.

There is a good deal doing in shears, both for exportation and home consumption, and these include cast-steel sheep-shears, double-bow and curved spring, as well as others. More activity is also apparent as regards horticultural and agricultural implements, such as budding and pruning knives, loppers or branch cutters, forks, rakes, scythes, as well as large knives for chaff-cutting machines, reapers, &c. The ordinary cutlery branches, although one or two houses are doing better, are but moderately off for business, and not much is doing on American account, but an improvement is now looked forward to as far as the States are concerned. File-makers are rather better off than they were, and the usual Government contracts have been received by Cammells and others, which run for three years. In crucible steel the production is of a steady character, as there is a fair output of wheels, axles, and heavy castings from it, whilst the requirements of the hardware establishments have not changed much. Edge tool makers have done a steady trade of late in joiners' materials as well as in heavier work. At the engine-works business is still but moderate; but some of the mechanics' shops appear to be doing fairly well. A good many lawn mowers are being turned out, the Sheffield special machine now taking the lead.

The South Yorkshire Coal Trade remains without much change. House coal does not go off so well, but a good business is the rule with respect to steam qualities, a large tonnage being now sent to both Hull and Grimsby, for shipment to the Baltic and other ports in the North of Europe. From here also a considerable tonnage of hard coal has been shipped to London and other of the home ports. In other description of coal the demand is quiet. Cokemakers, however, are doing well, and are sending considerable quantities into Lincolnshire and Derbyshire for the blast-furnaces in those counties.

REPORT FROM LANCASHIRE.

June 19.—Business in the Coal Trade of this district continues very quiet, but it can scarcely be said that it is in any very exceptionally depressed condition considering the time of the year. In most cases collieries are being kept working about four days, some few of them five days a week, and although the whole of the output is not going away the stocks that are being put down are due chiefly to the natural falling-off in the requirements for house-fire purposes, which has a tendency to cause all classes of round coal to be plentiful in the market. Consequently round coals, both for house-fire and general trade purposes, are bad to move, and for special sales or to clear away stocks prices are cut very low; but the ordinary quoted rates are without change. At the pit's mouth best Wigan Arley averages 8s. 6d. to 9s.; common sorts, 7s. Pemberton Four-feet, 6s. 6d. to 7s.; common house-fire coals, 5s. 6d. to 6s.; and steam and forge coals, 5s. to 5s. 6d. per ton. Engine classes of fuel meet with a moderate demand, but supplies are ample for requirements, notwithstanding the lessened quantity of round coal now being screened and the consequent smaller production of slack. Quotations are steady at late rates, but no higher prices are obtainable. Burgy at the pit's mouth averages about 4s. 6d. per ton; best slack, 4s. to 4s. 3d.; good ordinary qualities, 3s. 9d. to 4s., and common about 3s. 3d. to 3s. 6d. per ton.

For shipment there is a fair trade doing, but at very low prices. Lancashire steam coal, delivered at the High Level, Liverpool, or the Garston Docks not averaging more than 7s. to 7s. 3d. per ton.

The recent arrival at Liverpool of several cargoes of gas coal from Australia has given rise to a good deal of comment, which has invested the matter with more importance than it deserves. These cargoes can only be shipped profitably from the colonies when vessels coming over are so absolutely short of freights that they have practically little else to carry, and the coal can consequently be exported to England at almost a nominal cost; but that a regular competing trade could be established is out of the question. The coal itself, however, possesses most remarkable gas-producing properties; it is extremely light, and is so full of gas that, to quote an expression I heard, it could almost be forced out by the pressure of the hands; but for any other purpose it is altogether useless; it does not make a particle of coke, and has to be largely mixed with other fuel.

The wages question is again being brought to the front by the colliery proprietors in the West Lancashire districts. The question of a reduction has been under consideration at meetings held during the past week in Manchester and at Wigan, but nothing definite has yet been decided. There is, however, a very strong feeling that the present rate of wages is out of all proportion to the price obtainable for coal, and if thoroughly combined action can be secured there is little doubt that a reduction will be put in force before long.

In the Iron Trade a very quiet tone continues, and the approaching close of the year, with the usual stock takings, has a tendency to keep back the giving out of orders at present. There is also a prevailing belief in the continuance of low prices, and transactions generally are regulated by the conviction that there is no immediate necessity for buying beyond present requirements. The enquiries for both pig and finished iron have been very limited during the past week, and in the absence of any better prices being obtainable, makers are open to sell forward on the basis of the present low rates; but buyers appear to be quite indifferent about giving out orders, and the general tone of the market is weak. Lancashire pig-iron makers, who have given way a little, are now open to take 43s., less 2½, for forge and foundry, delivered equal to Manchester; but they are getting very few orders, and Lincolnshire iron, in which only a small business is reported, is offered for delivery over the year at about 42s. 6d. to 43s., less 2½. Hematites continue extremely dull, nominally quoted rates are unchanged; but buyers do not come within 1s. of makers' prices. Iron-founders report a few more orders stirring, but prices have still to be cut extremely low. The weight of business coming forward in the finished iron trade is very small, but for good qualities of bars prices are maintained at 5*l*. 15s. per ton, delivered into the Manchester district; there is, however, a little underselling on the part of merchants, and for immediate specifications rather less money would be taken in some cases. Engineers are kept moderately well employed; but old contracts are running out faster than they are being replaced by new orders.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

June 19.—The Coal Trade is this week in a more settled condition than when last I wrote, consequent upon the prevention of the threatened strike. An increase in the number of boats sent to the manufacturing collieries was observable at some pits at the end of last week, consumers desiring to lay in stock; but the number has now dropped to its usual proportion. Domestic coal is in very slow sale, and the competition of the Chase collieries with those of the older South Staffordshire district is increasing. Prices are without change upon the basis set forth last week. Steam coal is 5s. 6d. to 5s., and forge 6s. 6d. to 5s., according to quality and size.

The Pig-iron Trade is unrelieved. Consumers do not desire to increase their indebtedness, and as they have considerable deliveries to come in they are not buying with any spirit. All mines are 80s. for cold blast and 60s. to 57s. 6d. for hot blast. Common pigs are 42s. 6d. to 37s. 6d. The finished iron trade is without important change.

The Osier Bed Ironworks, Wolverhampton, are to be shut down after June 28 until such time as trade materially improves. Notice affecting 200 or 300 operatives has been posted at the works to this effect. The reason assigned by the owners is the impossibility of their being able to secure orders at consistent prices.

Until the very close of last week there was no indication of any desire on the part of the colliery owners to prevent a strike. At the last moment, however, the Earl of Dudley consented to give his men a fortnight's notice before enforcing the award. This led to a meeting at Dudley of the Coal Trade Committee, and it was then decided that such notice should become general. After "playing" on Monday and part of Tuesday at some of the pits the colliers, upon receipt of this intimation, resumed work, and at other than a very few excepional places, they are now steadily following their occupation. A strike has therefore, for the present, been staved off.

The relief which a month ago appeared possible for colliery owners and occupiers in the matter of a reduction in the maintenance and cost of the works of the Mines Drainage Commissioners has lost nothing of its practicability. Further details of the scheme that would involve such relief were given in Wolverhampton on Wednesday by Mr. Walter Williams, the Chairman of the Mines Drainage Commissioners, at an adjourned conference between the Surface Drainage Committee of that body and the thirteen local authorities, whose sewerage arrangements at present injure both the Commissioners' works and the River Tame. The Chairman recommended Parliamentary powers for the formation of a South Staffordshire Conservancy Board, to consist of five members representing the two main interests involved. This board would have full power over the surface drainage of the whole mines drainage area, and would use the sites of the Commissioners' streams, together with weirs and outfalls for a system of side tanks and collecting tanks, by which the whole of the sewage of the local authorities might be dealt with under a system of silent precipitation, the sewage and detritus being employed to restore to cultivation the old pit mounds of the Black Country. The scope of the scheme may be gathered from the fact that it affects a population of nearly 400,000, and property whose rateable value is about 1,000,000*l*. sterling, whilst the cost of maintenance of the system, when once established, would be equal to over a 1d. main drainage rate. The local authorities meet by themselves three weeks hence at Wolverhampton to further consider the proposal.

TRADE OF THE TYNE AND WEAR.

June 18.—There are still numerous complaints of the general state of trade in this district, and various opinions are expressed as to the probable duration of the serious depression. A better tone has prevailed during the last few days in the trading and commercial world; but a considerable number of ships are still laid up in the North-East ports. The demand for best steam coal continues good, and large shipments are made at Blyth and on the Tyne. This month's shipment to the Baltic is also large, in anticipation of the rise of 1s. 6d. per ton, which is to be made in the import duty on this coal in Russia. It is very discouraging that all countries appear to be determined to increase the import dues for the purpose of encouraging their home produce, and we are left alone in the practice of Free Trade principles. The shipments of coal at Tyne Dock for the week were 99,942 tons, against 89,212 tons in the corresponding week in last year, an increase of 10,730 tons. The shipments of coal on the Wear and at Seaham Harbour also continue good, and the prospect for next week is also good. The demand for all classes of coal is firm, and the terms vary from a week to ten days. Freights, both coastwise and to the Baltic, &c., are improving. The Committees of the Durham Coalowners' Association and the Durham Miners' Federation Board met in the Wood Memorial Hall, Newcastle, on Thursday last, for the purpose of trying to arrange a sliding-scale. After many interviews and considerable discussion they ultimately agreed to re-establish the scale that had governed the trade for the last two years for another period of equal extent, commencing from Aug. 1 next. The settlement of the case of the Durham miners so far, and also the ironworkers' dispute has given great satisfaction; the reduction pending in the wages of the iron shipbuilders is still unsettled, but in the present position of the trade, and looking at the fact that a large number of men are out of employment, the men cannot make much resistance to the reduction. The dispute respecting the rate of prices at Blaydon Main Colliery is to be referred to arbitration, and in the meantime the men have returned to work. The dispute with the men at Ramsay's drift in the same district has not been arranged, and the men still remain out.

Accidents to miners in this district from falls of the roof have been extremely numerous of late, and it is lamentable to notice that the majority of these accidents prove fatal. As each accident only causes injury or loss of life to one or two persons, little general attention is attracted to them, yet the total annual loss in this way is very serious, and our impression is that the number have largely increased of late, whence it is only natural to enquire what reason can be assigned for the apparent increase of casualties. As during the past few years the system of working long-wall has been largely introduced in the place of the old system of pillar and bord, some entertain the idea that some of the dangers may be traced to the cause, but whether this is the fact or not we are not in a position to state. If a comparison could be made of the number of accidents from falls of roof when long-wall work, and also when pillar and stall work is carried on, it might throw some light on this question. In many seams in this district the overlying roof is blue shale, or blue metal, as the miners call it, and this roof is very treacherous, and under any system of working the greatest possible care in examining and propping the roof is necessary to ensure safety. The trial in the coal trade—Dickenson *v.* Dickenson—will come on in London on July 1 next. It is a very important trial, and much interest is attached to it. The question to be tried is the working of coal mines in North Durham, and the apportionment of profits amongst the owners.

EARTH TREMORS AT SUNDERLAND.—There has been considerable alarm for some time in the Sunderland district owing to tremors or slight shocks resembling slight shocks of earthquake which have frequently occurred, and various opinions have been expressed as to the cause of these shocks. The opinion was held by many that the colliery workings from the Monkwearmouth Pits might cause these shocks. The workings in these mines are very extensive in three seams, the Maudlin seam being in some districts upwards 6 ft. in thickness, and they extend in a south-east direction upwards of 4½ miles, and, of course, they pass underneath the town of Sunderland on both banks of the Wear, but the great depth of these workings from the surface leads to the inference that it is scarcely possible that these tremors referred to can arise from this cause. There are also extensive lime quarries in the district, and it was surmised that the blasting operations in these quarries might cause these shocks. [Abstracts of the papers read at the North of England Institute of Mining and Mechanical Engineers on Saturday are published in another column.]

The slight upward movement in the Iron Trade reported last week has been well maintained, the makers' price, 37s. for No. 3, now controls the market. No. 4 forge is 35s. 6d. The fear of a duty being put on crude iron imported into Russia has a depressing effect. A portion of the Britannia Works, at Middlesborough, which were stopped, have been restarted. Generally, however, the manufactured iron trade is very quiet. There is no change in price of any moment. The shipments of pig-iron for last week were 16,467 tons, and there were over 12,000 tons of manufactured iron and steel sent away. The stocks of pig-iron held in this district continue to fall, and this is, of course, a favourable feature, and it is hoped that the trade will continue to improve.

A company has been formed in this district to work Bull's process for the manufacturer of iron direct from the ore in the Newcastle district. The distinctive features of the process is that no solid carbon is used in the furnace, which is charged only with iron ore and limestone. The furnace is worked exclusively with gas, which is delivered into it in a very highly heated state direct from the producers. There is thus no zone of gasification as in the old furnace, but only the zones of fusion reductions and carbonisation. There is also a calcining oven at the top of the furnace for treating the ore, and thus the zone of preparation is removed from the furnace. By this process is claimed not only the production of increased quantities from the ore, but also a vastly reduced cost, which is very desirable in these times. The formation of the company has been initiated by Mr. Craig, Engineer, Liverpool, acting for the Bulls Iron and Steel Company. A furnace to work the same process is now in course of erection in South Wales, where a strong company was formed some time ago. Marine engineers and boiler builders continue to be only moderately employed, but many general engineers and locomotive works are well employed, and some of them have increased the number of hands employed considerably of late. The North-Eastern Railway Company have considerably extended their works in Gateshead, and a considerable amount of new lathes and other machinery has been put down, and many additional fitters and turners, &c., have been employed lately.

The Society of Chemical Industry will holds its annual meeting in Newcastle-on-Tyne on July 9 and following days. This society is of recent origin, but its growth has been very rapid. It is just now beginning its fourth year of existence, and it already numbers more than 1700 members. It was founded in 1881, with the object of affording means of communication and intercourse amongst those engaged in the applications of chemistry to manufactures, and of recording the progress and contributing to the development and improvement of the various branches of chemical industry. The first annual meeting was held in Manchester in 1882, Prof. Roscoe in the chair, and the second in London last year, Sir Frederick Abel, being President, and Newcastle has been selected for the third on the dates above-mentioned, under the presidency of Mr. Walter Weldon, F.R.S., the inventor of the famous process in the bleaching-powder manufacture which bears his name. The meeting in Newcastle is looked forward to with great interest by the members of the society throughout the country, for Tyneside is associated more closely than any other district with the birth and development of the chief of our great chemical manufacturing industries, and the committee of the Newcastle section, under the chairmanship of Mr. J. C. Stevenson, M.P., are doing their utmost to render the visit of the members to Newcastle in every way a memorable one.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

June 19.—The returns of the local railways still show an increase over those of last year, which speaks well for the general trade of the district. The Anglesey and Carnarvon Direct Railway Bill passed unopposed last week. The Bangor and Bethesda Railway is to be opened on July 1. As a matter of precaution, the Tubular Bridge over the Menai Straits and other great works in Wales are carefully guarded day and night. Attention is being directed to the insufficient and unsafe character of the landing stage at Bangor Ferry, and it is hoped that the authorities of a town of so much importance, with its Cathedral and College, will provide landing accommodation suitable to the increased traffic on the Straits, and more in character with the standing of the town. Great dissatisfaction is being felt and expressed at the action of the authorities of the Penrhyn and Dinorwic Slate Quarries in reducing the price of slates 10 per cent. It is not considered that the state of the slate trade justifies this step, and the suggestion is freely expressed that it is a move on the part of the large owners to crush the smaller ones.

Following this step the workmen are to have a reduction of 10 per cent., so that they are made to bear the burden of the movement. The Mayor, aldermen. and citizens of Chester petition to be heard by counsel against the Chester and Connah's Quay Railway Bill. They allege that a bridge to open and shut cannot be worked so as to reconcile the punctuality of trains with the requirements of shipping, evidently forgetting that there are several bridges already in the Principality of the same kind where this is effectually done—one at Barmouth, one at Aberdovey, and a still more important one for the Great Western Railway at Carmarthen. Meanwhile the Council is not united in the matter, and an important member stated at their last meeting that the opposition to the Bill was "hatched in a lunatic asylum." On the other hand, 3500 citizens of Chester have signed a petition in favour of the Bill, and which the Duke of Westminster has undertaken to present to the House of Lords. The local authorities of Penmaenmawr are in conflict with the Woods and Forests with regard to the use of a gravel pit, the former claiming it as public property used from time immemorial, and the latter as the property of the Crown.

A new deposit of iron ore of excellent quality has been discovered at the base of the carboniferous limestone, near Denby, and 60 tons have been obtained by Mr. A. Jones as a trial sample. Owing to the press of work there is just now upon the land the limestone trade is quiet as far as local consumption is concerned. The demand for iron, glass, and chemical works keeps up, and large quantities of the rough stone are sent into Cheshire for the repairs of roads, there being an absence of suitable materials for this purpose on the Cheshire plain.

In connection with the Liverpool Waterworks in the Vyrnwy Valley, Alderman A. B. Forwood called attention in the City Council last Wednesday to the fact that on April 29 last 943,000*l*. out of the 1,250,000*l*. the works were to have cost had been spent. The Chairman of the Water Committee—Mr. Bower—said the works would last as long as the great Roman works and other works of antiquity, and Mr. J. B. Smith pointed out that the cost of the land, 125,000*l*., was not included in the original estimate, so that this sum remained to the good.

The appointments of Mr. W. H. Bickerton as quarrymaster and Mr. W. A. Legg as superintendent of the tramway and machinery were confirmed. The colliers of Buckly Mountain held a meeting on Saturday to consider the action of the masters in requiring from the men 21 cwts. to the ton, and also in reducing the prices for driving without notice. Mr. Booth, of Stafford, attended. It was resolved to endeavour to have these grievances removed. Between Aberystwith and Milford Haven there is not a railway which has as yet

reached the coast. There are, however, two in the course of construction, which are rapidly approaching completion—the Maenchlochog to Fishguard, and the Whitland and Cardigan to the latter town. In Cardigan lead mining is at a lower ebb than it has been for a century, and the same remark applies to the other lead mining districts of the Principality.

TRADE IN SOUTH WALES.

June 19.—The exports of coal from the principal ports in the month of May were as follows:—Cardiff, 659,219 tons foreign, and 87,355 coastwise, with 10,412 tons patent fuel and 1963 coke; Newport, 143,525 tons foreign, and 91,904 coastwise; Swansea, 91,168 tons foreign, and 56,368 coastwise, with 23,905 patent fuel. Last week Cardiff sent away 143,603 tons foreign, and 24,954 coastwise, with 7212 patent fuel; Newport, 36,816 tons foreign, and 25,654 coastwise; Swansea, 23,951 tons foreign, and about 14,000 coastwise, with 6134 patent fuel. The pressure of trade is somewhat relaxed, and prices are consequently easier. Good colliery-screened is quoted at Cardiff at from 10s. to 11s. per ton, and house coal at from 8s. 9d. to 9s. 9d. Small steam coal is in better demand.

The amount of iron sent away in the month of May from Newport was 17,430 tons, and 7487 from Cardiff. Last week Newport exported several large parcels as follows:—Montreal, 5100 tons; Galatz, 1510; Imbituba, 424; Para, 380. Cardiff sent away an aggregate of 3319 tons. The arrivals of iron ore at Cardiff last week were 15,783 tons from Bilbao, and 1444 from other places; Newport, 9022 tons from Bilbao, and 2810 from other places.

The Tin-plate Trade maintains its activity, and orders on hand keep the works going. The Penclawdd Works will shortly be restarted. Good IC cokes are not to be had under 16s., and charcoals are quoted at from 17s. to 18s. 6d. per box. Wasters and charcoal steel-plates are in great demand.

THE ADVANTAGE OF FINANCIAL PANICS.

"Sweet are the uses of adversity," the best of authority tells us. Financial adversity is no exception to the truth of this saying. It may be hard, says the Chicago Tribune, while the suffering that comes with falling houses and exploded credit and widespread dismay is upon us to see that there is any good or sweet in all that which seems so bitter, but still the good is there working out its curative purposes. It could not have been well that the deceits and betrayals of trust by Grant and Ward should have continued for ever. The unchecked continuance of extravagant railroad building could have been no benefit to any except the fools or knaves. The imposition of artificial liabilities on the avenues of transportation by the issue of watered stocks and bonds had to be stopped somewhere. If there were self-operative penalty in the markets for the private speculations of trustees and presidents of railroads and banks with funds in their hands that belong to other people, their defalcations and frauds would be carried on until the whole earth belonged to them. If we wish to see the bright side of the adversity that has overtaken us, we may find it in the disclosure, arrest, and cure it will bring of many of these evils.

It would be much better if we never had to take any medicine, but unfortunately man is liable to moral as well as to physical distempers. We ought, on the whole, to be glad that the same Providence that has given us our liability to disease has provided us with remedies. Panics do a good deal of purification. They have very medicinal effects. If our business communities were made up of men who had such good heads that they never made any miscalculations, and such good hearts that they never did any wrong, we need never have panics. There would never be danger in trusting any one with money or goods, credits and trusts would never be abused, runs on banks would not occur, and bankrupts would become as extinct as the mysterious Dodo. But there is no such Elysian state of affairs within the wildest dreams of human possibilities, and in default of perfection we must have panics.

But woe unto those by whom the panics come. They are justly abhored as the authors of untold misery. Whether they wreck the multitude by mistake, as was the case in the panic of 1873, or by immorality, as has been the case in 1884, the multitude will surely turn and rend them. Generals must never make mistakes. Good intentions will give a gentleman some footing, even if he is unfortunate, but a leader can stand only by being successful. But the criticism that overwhelms a mistaken leader is a mild fate to the infamy that is poured upon the head of him who is faithless. The disease that the present panic has particularly to cure is faithlessness. The ruin of values that is going on is the result of the betrayal of trusts by wholesale. Taking a broad view of the situation, it is impossible to see that there has been any such general indulgence in speculation as to warrant us in attributing to it the collapse that has taken place. Our merchants, manufacturers, farmers, and labourers have as a rule been working hard and honestly, minding their own business, and, with exceptions in spots, not running into debt or venturing into financial follies to any such extent as to threaten their own or their neighbour's equilibrium.

The values that came down in panic are those that went up in fraud. Fish, Ward, Baldwin, Seney, Eno, and a long line of others went up like rockets, and have come down like sticks. The values represented by their trusts and their enterprises have evaporated. The crisis has gone so far that there has been a sympathetic shrinkage on the Stock Exchange in good things as well as bad ones. All are members of one body, and when one suffers the others will suffer with it, but there has been nothing that merits the name of devastation except among those properties that were born in sin and shaped in iniquity, like the Wabash, for instance. From it inception in the hands of Mr. Gould and his associates the Wabash was a deliberate swindle. It was consolidated for the cold purpose of building up a fictitious semblance of property and value to be unloaded on the public. And so through the list.

It is on the whole best that this financial explosion has taken place in New York. Now that it seems assured that the distemper which is brought to the surface is not likely to spread too far, through its sympathetic effects, among the banks or the stock market as to produce any mortal results in the body economic or politic, we can look with equanimity upon its progress. A class of habitual criminals have been at work among us whom the laws seem unable to reach, close as they steer to its penalties. But the market can catch them, and under its pressure moral bankrupts are becoming financial bankrupts. Let the good work go on.

NATIONAL BOILER INSURANCE COMPANY.—The report of the chief engineer and manager—Mr. Henry Hiller—for 1883, recently presented to the directors has now been printed and contains in addition to the particulars of the accidents during the year, much valuable practical information, both as to the economic and satisfactory working of boilers, and as to the prevention of accidents. Thus with regard to the prevention of incrustation, it is stated that the evidence of many of the witnesses given before the Admiralty Committee on Steam Boilers, several years ago, clearly showed that zinc was effectual in numerous instances in preventing corrosion inside marine boilers, and also that the use of mineral oils in the steam-engine cylinders was preferable, as regards their effect upon the boilers, to those of animal or vegetable character. The experiments made under their direction also proved conclusively the value of zinc in preventing corrosion, but its effect in the boilers where it was used was shown to have varied very considerably. This, it is believed, arose from want of proper contact of the zinc and the iron. Some time ago an improvement in the use of zinc for preventing corrosion was submitted to me, the plan having been tried, it is stated with complete success, in marine boilers and to some extent in land boilers also. The improvement consists in copper wires being so inserted in masses of zinc, and connected with the boiler plates, as to secure necessary electrical connection. It is stated that the slight electric current, thus produced, entirely stopped the corrosion which was previously active in a number of boilers to which the apparatus was applied. Should it prove as effective in preventing corrosion and scale as is claimed for it by the patentee, it will be most valuable to many parties who are compelled to use water of a corrosive or otherwise impure character.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

THE PATENT PIANOFORTE METALLIC MECHANISM COMPANY (Limited).—Capital 100,000*l.*, in shares of 10*l.* To carry on the business of pianoforte and musical instrument manufacturers, in connection with certain patents. The subscribers (who take one share each) are—J. Palmer, Newington Butts; C. F. Dorn, 241, Malpas-road; G. P. Armstrong, 1, Cecil-street; J. C. Cottam, Edmonton; G. de Maid, 7, Caroline-street; D. C. Laughton, 21, Queen Victoria-street; A. Beckwith, 10, Noble-street.

HODKINSON AND CLARKE (Limited).—Capital 40,000*l.*, in shares of 5*l.* To acquire and carry on a business of manufacturers of revolving shutters, window blinds, shop fronts and fittings, school furniture, &c., established in Birmingham, London, and Liverpool. The subscribers (who take one share each) are—J. Hodkinson, Birmingham; G. Hodkinson, Birmingham; D. Clarke, Birmingham; W. Magrath, Sparkbrook; R. A. Dale, Birmingham; S. Ball, Stoke Newington; P. Shrapnel, 27, Walbrook.

THE ITALIAN WINE COMPANY (Limited).—Capital 100,000*l.*, in shares of 5*l.* To acquire, carry on, and extend the business of Norman, Oakley, and Co. The subscribers (who take one share each) are—J. W. Clarke, 16, Beaufort Gardens; W. Sapte, jun., Forest Hill; J. A. Burton, 110, Cannon-street; J. C. Cottam, 18, Laurence Pountney-hill; A. Olivo, Clapham; H. A. Trevanion, 19, St. George's-terrace; M. Ferrero, Forest Hill.

HENRY CONOLLY (Limited).—Capital 25,000*l.*, in shares of 25*l.* To acquire an established business at 53, Hampstead-road, 169, Drummond-street, and Tolmer-square, and to carry on the business of lead, zinc, glass, colour, and oil merchants, &c. The subscribers (who take one share each) are—H. Conolly, 53, Hampstead-road; S. S. Phillips, 10, Baker-street; F. Foxley, 18, Leinster-terrace; T. J. Boubling, 16, Union-street; G. Tate, 258, Camden-road; T. H. Chapman, 10, Highbury-grove; H. W. Davie, 8, New Inn.

THE NATIONAL LIBERAL CLUB BUILDINGS COMPANY (Limited).—Capital 200,000*l.*, in shares of 5*l.* To establish and maintain in London a club-house, buildings, &c. The subscribers (who take one share each) are—G. Armistead, 4, Cleveland-square; W. Agnew, Summer Hill; W. L. Bright, 22, Queen's Mansions; E. Lloyd, 17, Delahay-street; J. R. Cleave, 58, Grosvenor-road; R. S. Watson, Gateshead-on-Tyne; A. J. Williams, Eastbourne.

THE MCNARY MACHINES COMPANY (Limited).—Capital 50,000*l.*, in shares of 5*l.* The business of machine makers in connection with certain patents, engineers, ironmasters, founders, and general contractors, &c. The subscribers (who take one share each) are—E. M. Wright, 69, Lombard-street; W. Holland, 45, Bread-street; C. H. Gill, 6, Christian-street; E. H. Busk, 45, Lincoln's Inn; A. J. Frost, 11, London-street; G. Moffatt, 6, Lime-street; K. McLean, 39, Lombard-street; J. B. Ball, 1, Gresham Buildings; R. D. Smith, 2, Bow Common-lane; S. Pixley, 27, Old Broad-street.

THE INVENTORS' MART (Limited).—Capital 25,000*l.*, in shares of 1*l.* To acquire, use, send, and otherwise deal with British, Colonial, and foreign inventions and patents, &c. The subscribers (who take one share each are)—A. Gardner, West Ham; H. Bamerichter, 71, Rosoman-street; E. G. Wills, Peckham; C. W. Phillips, Sidcup; F. C. Boyle, Plaistow; E. J. Pearson, Hackney; J. W. Hutchinson, 431, Kingsland-road.

BRYANT AND MAY (Limited).—Capital 30,000*l.*, in shares of 5*l.* To acquire and carry on an established 'match manufacturers' business at Bow, E. The subscribers (who take one share each) are—W. Bryant, Surbiton Hill; F. C. Bryant, Leatherhead; O. H. Trummer, 4, New London-street; H. W. Powis, 101, Leadenhall-street; H. Evens, 131, Tuffnell Park-road; W. Westlake, 40, Nottingham-place; H. Cooke, 20, New Bridge-street.

THE WEAVER HALL BRINE AND SALT COMPANY (Limited).—Capital 100,000*l.*, in shares of 5*l.* To supply brine, and manufacture salt and other chemical products, and deal in, sell, and dispose of same. The subscribers (who take one share each) are—E. F. Peel, Rock Ferry; J. W. Raynes, Rock Ferry; J. Starkey, Liverpool; T. Barrow, Rock Ferry; P. R. Barrow, Rock Ferry; R. Jameson, Liverpool; E. B. Hatfield, Rock Ferry.

THE CLUB PROPRIETARY (Limited).—Capital 25,000*l.*, in shares of 5*l.* The usual business of club proprietors, with or without the business of wine and spirit merchants. The subscribers (who take one share each) are—C. D. Hoffenden, 10, John-street; M. R. Hoffenden, 44, Dover-street; C. A. Pritchard, Blackheath; W. H. Jerram, Ewell; P. L. Phipps, Acton; C. H. Oldham, 18, Adam-street; R. W. Duff, 71, St. George's-road.

MAUGHAN'S PATENT GEYSER COMPANY (Limited). — Capital 10,000*l.*, in shares of 5*l.* To acquire and continue at 41, Cheapside, the business of gas and hot-water engineers, manufacturers of water-heaters, or Maughan's Patent Geysers, &c. The subscribers (who take one share each) are—B. W. Maughan, 41, Cheapside; T. Barralds, 6, Holywell-row; M. A. Goymour, South Tottenham; E. Goymour, South Tottenham; J. P. Barrald, Colney Hatch; W. F. Dailey, 240, Old Ford-road; R. E. James, 47, Victoria Park-road.

THE EASTERN COUNTIES LAND AND INVESTMENT CORPORATION (Limited).—Capital 250,000*l.*, in shares of 5*l.* The usual operations of a land company and building society in all branches. The subscribers are—H. Eastes, Walthamstow, 40; C. W. Chaston, Harleston, 40; W. H. Richards, 31, Mark-lane, 40; C. Rawle, Lewisham, 40; J. H. Kelly, Hammersmith, 40; A. P. Little, Dalston, 40; C. Rawle, Lloyds, 10.

THE CONWAY SILICA COMPANY (Limited).—Capital 5000*l.*, in shares of 10*l.* To acquire the interest in a lease of mines, minerals, and beds of silica, fire-clay, &c., for the purpose of fully developing and working said property. The subscribers (who take one share each) are—W. Schofield, Liverpool; W. Lockhart, Liverpool; R. J. Noble, Liverpool; H. Holt, Liverpool; T. B. Whitehead, Heswell; A. P. Barr, Birkenhead; F. W. Schofield, Liverpool; E. J. Bevan, West Kensington; J. Chadwick, Birkenhead.

BLANCH BRAIN BROTHERS (Limited).—Capital 10,000*l.*, in shares of 2*l.* The business of mining and electric engineers, manufacturers of and dealers in all kinds of machinery, apparatus, and chemical products used in connection with mines, and any application of hydraulic or pneumatic force, or electricity. The subscribers (who take one share each) are—J. Darlington, 1, Coleman-street Buildings; J. G. Wood, 7, New-square; O. Reichenbach, 6, Victoria-street; R. G. Elwes, 7, Westminster Chambers; C. M. Owen, 6, Westminster Chambers; W. B. Brain, Cinderford; E. N. Haxell, Kingsbury.

THE COMMERCIAL PRESS COMPANY (Limited).—Capital 30,000*l.*, in shares of 10*l.* To acquire the Daily Commercial Times, and to carry on the business of printers, publishers, newspaper proprietors, &c. The subscribers (who take one share each) are—C. J. Bellamy, 126, Warwick-street; T. A. Wilson, 57, Coleman-street; J. Dare, 6, Wine Office-court; J. D. Atkins, 5, Bishopsgate-street, Within; A. Brown, Dalston; J. Macdonald, Dalston; J. R. Swan, 26, Budge-row.

THE VULCAN STEEL AND FORGE COMPANY (Limited).—Capital 100,000*l.*, in shares of 10*l.* To acquire and carry on certain works at Saltburn, Barrow-in-Furness, belonging to the Bessemer Steel-works. The subscribers (who take one share each) are—T. B. Massicks, The Oaks; D. Laird, Ulverston; W. H. Smith, 9, Finchley-road; H. Cook, Barrow-in-Furness; H. B. Massicks, Askam-in-Furness; D. Adamson, Dewsbury; T. Briggs, Barrow-in-Furness.

THE NORTH MEXICAN SILVER MINING COMPANY.—The vendor sailed on Saturday in order to hand over possession of the mines to the company's representative, and operations are to be vigorously commenced immediately.

ENGLISH AUSTRALIAN GOLD.—An extraordinary general meeting of shareholders was held at the office of the company, Austin Friars, on Wednesday (Mr. John Schofield in the chair), for the purpose of confirming a resolution authorising the directors to dispose of the property. After a few remarks from the Chairman, explaining that the business was purely formal, to confirm what had already been resolved upon after full discussions at previous meetings, the confirmatory resolution was unanimously passed, and the meeting terminated with a vote of thanks to the Chairman and directors.

Meetings of Public Companies.

NEW POTOSI COMPANY.

The statutory meeting of shareholders was held at the Cannon-street Hotel, on Wednesday,—Mr. E. L. J. RIDSDALE in the chair.

The SECRETARY read the notice convening the meeting

The CHAIRMAN said: Gentlemen, this meeting, as you are aware, is the statutory meeting which the Act of Parliament obliges us to hold withing four months after the incorporation of a new company. We have no special business to transact on this occasion, and no resolutions to propose, but I propose to give you an account of the progress of the reconstruction of the company in the first place, and in the second I shall tell you what we have done during the five months that we have been at work in developing the mine since the company was reconstructed, and what money we have expended, so that you may be able to forecast what are the prospects of the company in the future. Well, with regard to the reconstruction, the whole of the reconstruction, I am happy to tell you, has been successfully carried through; the mortgage debt has been completely obliterated with the exception of only 400*l.* of debentures, of which notice has been given that they will be paid off in a few days, and the whole of the shares have come in with the exception of 8000 which are still outstanding, and that with the large amount of share capital—350,000 shares—I think you will agree with me is a very satisfactory piece of business. With regard to our financial position we have now in hand, including the calls on the shares, 36,000*l.*, and we have operated five months on the mine in developing and in sinking shafts and pushing on the levels, and, in fact, opening out the mine which, as you are aware, when handed over to us by Mr. Fitzgerald had been hardly touched at all. Mr. Scriven, who went out to the mine, calculated for some four or five months after the mine had been properly set going we should require about 3000*l.* a month expended on the mine to open it out, on which he expected the mill would repay about 1000*l.* from the gold. Well, that has been almost exactly the result that has been achieved. You will see from the map what has been done in the five months. We have spent in that time 16,000*l.*, which is at an average of 3200*l.* a month. We have been running during four months of that time 15 stamps only, because the mine was not in a condition to run a larger number. Now, for the last month we have run 25. We are feeling our way, but we have extracted during that time 1200 ozs. of gold, which is of the value of 4200*l.*, so that you will see out of the 16,000*l.* about 4200*l.* has been returned to you by the mill. That is as nearly as possible confirming the estimate Major Scriven made when he went out. We have sunk in shafts and winzes 221 ft., and in levels we have driven 683 ft., making together 904 feet. Now, the great point, of course, that you all want to know is how far the chances are that the mine now reconstructed as it is with a reasonable amount of capital—only 300,000*l.* in all—and with the working expenses economically conducted as they are at present, what reasonable expectation we shall have of being in sight of a dividend, and in what time. From the five months that we have been at work we can give you a very fair estimate of what our expenses are, and you will see from the figures I have already read that about 800 ozs. of gold pays all our expenses—800 ozs. being 3200*l.*, and 3200*l.* was the monthly expenditure as an average over five months, and that, I may add, includes the home expenses. You will be able to judge in this way—by adding two of our fortnightly telegrams together you will be able to see if they amount to 800 ozs., in which case your expenses will be paid, and anything there is over is profit, and will go towards the payment of a dividend. Well, for the last month during which we have run 25 stamps we made 375 ozs. of gold, that is nearly half, and then we were running upon ¾ oz. stuff our manager told us, and he also told us that he hoped next month to be running on 1¼ oz. stuff. The telegram which ought to have come to-day has not arrived; it has not in the case of any of the other gold mines, so that probably there is a delay of the steamer. At all events, if the telegram is a good one our good natured friends will not be able to say we have had it concocted entirely for the meeting. But I hope the telegram will be a fair one and corroborate what our manager says——

Mr. PROVIS: That he is getting under the paying shoot.

The CHAIRMAN: The point to which I wish to call your attention is this—That I do not think it is fair to take the amount of gold we have for the last five months as a correct indication of what we may fairly expect for the next five. We have not got fairly into the paying shoot. We are not forcing the mine; but we are developing it carefully in order to have enough to supply our mill continuously without making any stoppages. There is such a thing as forcing a mine too fast; we are endeavouring to keep the mine in advance of the mill. We are running 25 stamps, and when Mr. Provis goes out in the autumn he will take two rock-drills with him, and then he will be able to run 40 stamps, and we shall materially increase the return of gold. Of course, you must recollect that when we are running a larger number of stamps our expenses will proportionately increase, but our gold will increase likewise; at present 800 ozs. output pays all our expenses. With regard to water, on which we all had some doubts at the last meeting, that is, I am glad to say satisfactorily settled. A letter from Mr. J. Provis tells us that there is plenty of water. He has gone down to a considerable depth, and there is every prospect of a continuous supply for 40 stamps, and that is independent of the amount of water we can use ourselves from the shafts of the Peru Mine. With regard to the liquidation expenses we have carried that all out, and the whole of the expenses of liquidating the old company and reconstructing the new have been 700*l.* I think you will agree with me in a large company—450,000*l.* capital, considering the debentures as well as the share capital—that is not an unreasonable sum. I shall be very happy to hear any questions that may be asked by shareholders, and to reply to them. We have here Mr. Scriven, a director who has recently returned from the mines, and who is perfectly acquainted with the property on the spot, which, unfortunately, I am not. We have also Mr. Provis, who has returned even more recently, and he will be able to give personal explanations regarding points which he has viewed with his own eyes, which is perhaps better than taking things second-hand from me. We have no resolutions to propose. I have shown you what in my judgment is the position of the company—that we are in a fair way of advancing towards prosperity, and I really believe we shall bring the concern into a good paying condition in the course of a few months.

Mr. BLADON: I think it would be gratifying to yourself and brother directors if some few remarks were made on this side of the table, if only by way of congratulating you on meeting us in a sound position, with a reconstructed company, with a fair amount of capital, and without any complications whatever. I hope that you will look into the expenditure, and that the results will be such as will fairly remunerate us for the past, which I, so far as I am concerned, desire to obliterate. Basing the capital at 300,000*l.* only, without any complications except a small amount of preferences which only have a dividend if it is really earned, and which are not cumulative, we may say that from the time we make profits the ordinary shareholders will have a dividend. You commence with a splendid mill, no one doubts that; but, unfortunately, in the past mining operations have been neglected, but conducting mining operations now with judgment and discretion, I for one think, dating from the present period, we may look forward to a very satisfactory future.

Mr. PROVIS, C.E. (the general manager) said that after the lucid remarks of the Chairman very little remained for him to say. Our great object is to get into a pay shoot. We have now hoisting apparatus capable of answering our requirements, and he thought that with the present appliances for opening the mine, we could keep 30 stamps at work. At the end of the year he purposed going out and putting up the other 30 stamps—when they would have 60 stamps erected, and at any rate they would have 40 stamps at work. That was, provided the mine opened out as they had every reason to expect it would. When we started the levels the quartz yielded only 4 dwts. to 1 ton, but the average of the whole now would be a little over ¾ oz. He telegraphed home that in one level we had 2 ozs. rock, and the question had been asked why they did not put it through the mill. That stuff came from one point where they could only break about 30 tons a month. We get our ore from seven different points. The cost of the rock-drills would be 1200*l.* to 1500*l.* in London, and a similar amount for freight and erection. When they were up they would be ample to keep the extra stamps at work. We have an ample supply of water for continuous working of the mill, and an abundant supply of wood for all purposes.

Mr. RUGG: Can you give us any information about the mill? Somebody said it was a silver and not a gold mill.——Mr. PROVIS said the mill erected was adapted for a gold mill. They had now one of the best mills in the country.

Mr. SCRIVEN having also spoken in favourable terms of the prospects of the mine,

A vote of thanks to the Chairman and directors terminated the proceedings.

ORGANOS GOLD MINES COMPANY.

A general meeting of shareholders was held at the Cannon-street Hotel, on Wednesday,—Mr. A. FOWLER presiding.

Mr. A. RUSSELL (the secretary) read the notice convening the meeting.

The CHAIRMAN said he had no resolutions and practically no business, so called, to lay before the meeting on that occasion, and his sole object in calling them together was that after the absence of Mr. Green, the manager and superintendent for nearly three years, the directors deemed it their duty upon his return to take the earliest opportunity of convening a meeting in order that they might have from him a description of their property, and an account of its prospects. Experience only tended to confirm the high opinion the directors entertained of the property. He wished to say a few words as regarded the Socorro lode. They would doubtless remember it was about this time last year the Socorro was discovered, and at first the directors believed this lode was upon the company's property. This, however, appeared to have been incorrect, as the Socorro was outside the company's boundaries, and unfortunately was already in the possession of a number of Spaniards, who had formed a somewhat high opinion of its value. The manager was asked if he would purchase it on behalf of the company, but in their straightened circumstances at the time, he did not see his way towards paying the necessary money. However, Mr. Rogers, a large shareholder, visited the mines soon after the discovery of the Socorro, and he immediately purchased it from the original owners, and on his return entered into an arrangement with the directors to re-sell to the company. This of course, in consequence of the lowness of their funds, could not be done at the time, but an arrangement which, he thought, would be satisfactory to the shareholders had been made. This was that the company should have the power of working the Socorro Mine upon the same terms as the original property, *i.e.*, taking a lease and paying a royalty upon all the gold raised, letting the company, however, purchase the freehold within 12 months for 10,000*l.* It would, therefore, be observed that Mr. Rogers, the present owner, really entered into the speculation with the company on very fair terms. He purchased the mines for a given sum of money, and should they not prove of value he would really have lost all the money he paid. On the other hand, should the Socorro turn out to be as valuable as was expected, he would receive 10,000*l.* from the company, which would fairly repay him for his trouble and risk, while the company would have secured for the same amount—10,000*l.*, a property which might prove of infinitely greater value. He might mention

that the directors had very great difficulty in bringing about this arrangement, as the vendor was most anxious to delay coming to terms in order that he might, after the experience of a few months, see what the mines were really worth, while a very much larger sum was asked than that which had now been arranged for. The directors were of opinion that what had been done in respect of the Socorro should prove very satisfactory to the shareholders, as had they had to pay even a comparatively small sum for the property last year they would inevitably have had to give it up entirely; now, however, the company, while having to pay, probably, a somewhat increased price, had only to do so when it was proved that the mines were well worth it. Considerable work had been done on the lodes, and they appeared to have justified the high opinion which had been formed respecting them, for in return for every 1*l.* which had been expended the shareholders had gained a clear profit of equal amount; and so even supposing at the end of the present year the board were to consider that they could not secure the mines, the company would nevertheless have gained a profit by their means. He did not know that there were any other remarks for him to make, beyond to repeat what he had said on previous occasions—that he saw no reason to modify any expression of opinion which he might have given them hitherto as regarded the value of their property, and that each and every one of the directors believed that only a short time would see a fulfilment of all calculations and promises that had been made.

Mr. J. G. GREEN, in the course of a lengthy report, expressed his confidence in the prospects of the shareholders. Besides the Constancia and Té Encontré lodes there had been several others met with in making roads, &c.—some of great strength and promise, but owing to the shortness of funds prevailing up to recently no work had been done to test their value. During the past year a discovery was made (not in the company's property), but in the Socorro lode. This lode had been secured for the company. It had so far proved very rich, all the stuff taken from it having yielded an average of about 1 oz. to the ton. Such an average quantity of gold would pay splendidly, and even with the present small crushings he considered that for every 1*l.* expended 2*l.* had been taken out. Of course much depended on the opening out of the lode in sections, and there was good ground for believing that the Socorro would yield very large profits. Their mill was of the most complete description, and contained a large stoneb aker, 24 heads of rotating stamps, and very effective amalgamating and concentrating apparatus and machinery, all properly housed in a very substantial manner. The motive power was one of MacAdam's turbines, and was sufficient with the fall at command with their present watercourse for three times as many stamps as they had at present in operation. An assay office with complete fittings was attached. Their crushing power at present was equal to 500 tons a month—quite sufficient to yield a large profit to the company. Nevertheless, he thought it would be of great advantage to send out a further 24 heads of stamps and accessories, as it would take some time to get them on to the ground and erected. This, however, could be postponed if wished, as the present mill was sufficient to yield a good dividend on the capital if kept in full operation. A 24-stamp mill (the stamps being only 250 lbs. each) was undoubtedly a small one, but the mine was so placed and had such advantages in water-power, &c., that it could be worked at very little expense. They had proved that 5 dwts. of gold per ton with the stuff in quantity would pay good dividends, &c. Under proper management he saw no reason why the mines should not make very handsome profits with 40 or 50 heads of stamps at work. They could challenge comparison with any foreign mines worked by English capital. With a comparatively small sum they had established and organised a concern in a very out-of-the-way place, containing a population, all properly housed, of about 200, most of them skilled miners, but from a distance. They had a most complete mill, which treated the stuff at the rate of 2s. 6d. per ton, which would compare with anything done in California or Australia, and they had returned 1200 ozs. gold. All that was now required was to extend their operations, and open up the mines on a large scale, and he had no hesitation in affirming his ability to carry out the promises held out in the prospectus.

In reply to questions it was stated that upwards of 10,000 new shares had been issued, and something like 6000 of them had been subscribed, and they had only expended about half the money.

On the motion of Mr. T. TALLENTIRE, seconded by Mr. ULLATHORNE, a resolution was passed unanimously approving of the action of the directors in securing the Socorro lode, and expressing the opinion that the directors had done the best that could be done in the interests of the company.

Mr. BIGG proposed and Mr. POWELL seconded, and it was carried, that the thanks of the meeting be voted to Mr. Green for his services.

A vote of thanks to the Chairman terminated the proceedings.

CHILE GOLD MINING COMPANY.

The third ordinary general meeting of shareholders was held at the Cannon-street Hotel, on Thursday,

Mr. JOHN HARVEY in the chair.

Mr. J. S. WRIGHT (the secretary) having read the notice convening the meeting, and also a further notice stating that the meeting would be held *pro formâ* and adjourned to a later date, in order to enable the committee of largest shareholders in consultation with the board to lay before the general body of shareholders a scheme for placing the company on a sound financial basis.

The CHAIRMAN: On this occasion, as this meeting is only formal, I move that it be adjourned until July 10.

Mr. MAY (a shareholder): I beg to second the resolution. The Chairman naturally feels his tongue rather tied, as hose shareholders who stayed away on the strength of the notice that the meeting would be merely formal would feel aggrieved if matters were gone into for the benefit of those who are present. Perhaps I may say unofficially that we have been increasing our possessions in Venezuela, and for this and various reasons, it is thought desirable some small addition of capital should be raised. Instead of deciding for themselves what should be done, the directors thought it desirable to call together the large shareholders to confer with them; a meeting was accordingly held, at which the Chairman explained matters, and then the meeting appointed five gentlemen to confer with the directors and advise what steps should be taken. A joint meeting of the directors and the committee was held, I think a week ago, and as the course which was generally approved would require some alterations to be made in the Articles, and as it would take some short time to settle the details, it was proposed that this meeting should be adjourned until July 10, in order that the resolutions which would be necessary should be placed before the meeting, and a second meeting rendered unnecessary. It was thought better not to trouble the shareholders as a body to come here more frequently than necessary. There are some thousand shareholders. I do not think it is necessary to say more than the matters are in train, and I may say that they are progressing satisfactorily, and I hope that when they are all put straight you will find our mine, though depressed at the present moment, will be in a satisfactory position.

Mr. SCHOFIELD: I should like to have some explanation of the necessity for this capital. It seems to me that the company has been going on in an extravagant manner since the formation. The working expenses are exorbitant. We have arrived at 60 heads of stamps, which is nearly the number that was intended when the company was first started. We have spent double the money it was originally stated we should spend. The expenses are 4*l.* 5s. a ton; the meeting of shareholders may not be aware that stamping and amalgamation in other gold districts, particularly in Australia and California, is only about 1s.6d. to 2s. a ton. You lament the low produce of the quartz, but I think you ought to have lamented the very high working expenditure. I do not see the reason for it myself. Labour is quite as dear in California and Australia as it is in Venezuela, and I think our amalgamation and working expenses should be reduced to 5s. a ton as a maximum. I hope the committee will look into these matters, because I think we have more to hope for from the reduction of the expenditure than we have from the increase in the yield.

Mr. MAY: We will go into all that on July 10.

The CHAIRMAN: As Mr. May, who is on the committee, justly remarked, at the present moment my tongue is somewhat tied, but I am quite prepared to meet any shareholder after this meeting, and to satisfy him on all points referred to by Mr. Schofield. You can understand it would not be fair to absent shareholders to go into these matters at the present momcnt, but I am quite prepared to meet any shareholder.

Mr. SCHOFIELD: I called on you six weeks ago, and understood that all the debentures were raised and the balance would be equal to the wants of the company. I am very sorry to find that 25,000*l.* more is required. I see that 25,000*l.* is owing at the mines for stores, wages, and so on.

The CHAIRMAN: If Mr. Schofield will come to me afterwards I shall be very happy to give all the explanation which I am prepared to do to a general body of shareholders here present. I think no one can complain of the course.

Mr. MAY: It will be all given on July 10. This meeting is simply *pro formâ*, and I, as the shareholders have been told not to come, it would be rather unfair to go into details. You cannot go into the matter without doing it thoroughly. It will all be given you in a fortnight's time.

Mr. WEIR: Who are on the committee, may I ask?——The CHAIRMAN: Mr. Young (representing 18,000 shares), Mr. Freeland, Mr. May, Major Ramsay L'Amy, and Mr. Fossick.

Mr. WEIR: What amount of money do you require to put things into condition?——The CHAIRMAN: That is a question that I really think I am justified in declining to answer at the present moment.

Mr. WEIR: But we are called here to day.——The CHAIRMAN: Simply as a formal matter.

Mr. WEIR: But we want some information.——The CHAIRMAN: I shall be very glad to give you information afterwards to satisfy yourself.

Mr. WEIR: What is the object of this meeting?——The CHAIRMAN: It was called, and we found it necessary to adjourn it for the reasons stated in the circular.

Mr. WEIR: I have come a very long way.

The CHAIRMAN: Did not you get a notice stating that the meeting was to be adjourned.——Mr. WEIR: No.

Mr. WRIGHT said that he had sent the notices to the registered address of all the shareholders.

Mr. WEIR: I think there must be something wrong in the issuing of the notices. I have come 300 miles, and it is only since I have arrived here that I have heard of the adjournment.

The CHAIRMAN: The notices were sent to all the registered shareholders, according to the addresses.

Mr. SCHOFIELD: There is no intimation in the report that fresh capital will be wanted.

Several SHAREHOLDERS said they had not received notice of the adjournment.

The CHAIRMAN: We cannot be responsible for the faults of the Post Office. All the notices were posted.

Mr. MAY: You see, gentlemen, the difficulty would be this:—The Chairman has sent a notice saying the meeting will not be held. Well, if the meeting was held somebody might propose a resolution insisting the directors should resign their seats. I only put that forward as an illustration. Absentees would say what a monstrous thing. You told us not to come, and you have done something behind our backs which should not be done. I do not think you could do it.

Mr. SCHOFIELD: We ought to know the cause of the sudden demand for money.

Mr. MAY: When it was mentioned to the large shareholders we all thought it was necessary.

Mr. SCHOFIELD: It ought to have been been put in the report.

The CHAIRMAN: The report was published before; but what more can I say than that I am prepared to satisfy you afterwards. Will it be any more satisfaction to you to be satisfied in public than in private.

Mr. SCHOFIELD: This report comes out, and a few days afterwards it is stated that a large sum of money is wanted; if it was known at that time it ought to have been stated in the report.

Mr. MAY: May I say the suggestion has come from me that the additional capital should be raised. I knew nothing about it when the report was issued.

Mr. WEIR: If there is to be no meeting to-day why did the directors call us together at all?

Mr. MAY: It was intended that the meeting should be held, but afterwards they summoned the largest shareholders, and they suggested it should be adjourned.

A SHAREHOLDER: What calamity has befallen the mine?——The CHAIRMAN: None. At the meeting of the largest shareholders this committee was appointed, and it was their recommendation that this should be done.

Mr. SCHOFIELD: Who called the meeting of the largest shareholders?——A SHAREHOLDER: I knew nothing of it.——The CHAIRMAN: If the shareholders had responded to the appeal of the directors when they were asked to do so, more than 12 months ago, it would not have been necessary. They did not do so, and therefore the shareholders are alone to blame.

Mr. SCHOFIELD: What amount of debentures did you ask for?——The CHAIRMAN: 75,000*l.* We reserved 10,000*l.* to be issued when we thought proper. The shareholders did not come forward, and therefore they placed the board in a peculiar position.

Mr. SCHOFIELD: 65,000*l.* of debentures you have had.

The CHAIRMAN: It is in the accounts, and, as I said before, I am prepared to meet any shareholder individually and explain everything.

A SHAREHOLDER: We are here to-day to get information.

The CHAIRMAN: In justice to absent shareholders it cannot be given.

Mr. WEIR: I beg to move that this meeting be not adjourned, but that we go on with the business.

Sir CHARLES CLIFFORD: The gentleman forgets the greater proportion of the shareholders have stayed away because they have a notice that this meeting will be adjourned. It would be very unfair to them to hold a meeting now.

The motion for adjournment was then put and carried, and the proceedings terminated.

PRINCE OF WALES MINING COMPANY.

A general meeting of shareholders was held at the offices of the company, Gracechurch-street, on Thursday,

Mr. J. Y. WATSON in the chair.

The accounts showed a balance of liabilities over assets of 1556*l.* 18s. 1d., and the agent's report was read, as follows:—

June 17.—Since the last meeting we extended the 102 fm. level east 5 fms. 4 ft. 8 in. on a lode 4 ft. wide, of a very promising character, and worth 6*l.* per fm. for tin; lode in present end 4 ft. wide, worth 7*l.* Since which we have started a rise 5 ft. behind the end, in the intersection of the lode and cross-course, in order to lay open a good and profitable section of ground for stoping, and also ventilate this part of the mine. The rise is up 9 fms., and we expect to hole in a week from this time, and be in a position to increase returns. The 102 west has been driven 9 fms.; lode from 2 to 3½ ft. wide, worth 1 ton of copper ore, and 4*l.* for tin, and is now improving. Stope in back of this level (102 west), east of rise, lode 4 ft. wide, worth 4*l.* for tin. No. 1 stope, west of rise; lode 3 ft. wide, worth 1 ton of copper ore, and 2*l.* for tin. No. 2 stope, west of rise, lode 4 ft. wide, worth 4*l.* for tin, with a little copper ore. The winze in bottom of the 90 west has been sunk 7 fms., and communicated with the 102. We are now blasting down the lode, and stoping the same from the bottom of the 90; lode 3 ft. wide, worth 3 tons of copper ore, and 3*l.* for tin. The 90 west has been driven 11 fms. 4 ft. 9 in. in the new Silver lode by the side of the Prince of Wales lode (in this drivage both lodes are close and parallel), which in the first 8 fms. drivage is 3 ft. wide, composed principally of strong, kindly capel, copper ore, mundic, and tin, worth in places 8*l.* for copper ore, in the last 3 fms. it declined in size and value, and in the present end is cut quite out, which we long expected would be the case, in consequence of the large Silver lode passing through it, and we think it very probable it may heave or carry it with it some distance (as the Silver lode has a very strong flookan with it) before we reach the western point of junction, where we anticipate finding a rich lode. Our prospects are certainly very good in this direction. Stope in back of the 90 east, west of No. 2 rise, lode 3 ft. wide, worth 5*l.* per fathom for tin. Stope in back of the 77 east, lode 3½ ft. wide, worth 4*l.* 10s. per fathom. We have three tribute pitches working in back of 90 east at 13s. 4d. in 1*l.*, and one in back of 45 west at 10*l.*; lode 7 ft. wide, worth 20*l.* per ton for tin, which is in whole ground to surface. In taking a prospective view of the mine in the bottom eastward, and the 90 westward, I can arrive at no other conclusion than in the Prince of Wales Mine, if perseveringly developed you have a valuable property which may repay all outlay in a very short time.—S. ROBERTS.

The CHAIRMAN said in the accounts presented to-day there are four months' costs against the usual returns of tin but only two months' copper ore, for the thirteenth month of the year now comes into the account for three months, and copper ores are only sold two monthly. This meeting has been called earlier than usual on this account, and also because the committee find the costs of working so heavy and the difficulty of getting in calls so great that they desire to consult the shareholders as to whether it would not be better to restrict operations for a time until metals improve. The agent is present to explain the state of the mine, and advise as to the best means to adopt. At the last meeting he attended he reported a good discovery, and led us to expect we should find there tin to pay our way, and even make profits, and though the result has turned out very differently it is only just to him to say that the mine at that time was inspected by two independent agents, and they confirmed Capt. Roberts' report. At the last meeting the loss on four months' working was 1363*l.* 7s. 8d., taking four months' costs against four months' returns. The accounts for this meeting show four months' costs 2227*l.* 16s. 5d. against three months' returns only of 658*l.* 11s. 10d., and a deficiency of 1556*l.* 18s. 1d. It will be observed also that the arrears of calls amount to 326*l.* 2s. 6d., and the sum advanced by the treasurer to 391*l.* 14s. 9d. The monthly costs are heavy, and the committee have taken means to reduce them consistently with the proper working of the mine. After a long discussion with Capt. Roberts we learn that there are one or two points in the mine that show great promise, and which, should the shareholders wish to restrict operations for a time, might be kept at a loss of about 100*l.* a month to commence with, and work their way perhaps, into a profit. In the 90 east a lode worth 20*l.* to 25*l.* per fathom was gone over for 20 fms. in length. For some months past a rise has been going up from the 102 to open out this ore ground, and it will be completed in about a week's time, when pitches could be set at once. Now, supposing this ground to continue worth 20*l.* per fathom down all the way to the 102, it would open out 240 fms. of ore ground. Again, in the 45 west there is a tin lode worth 20*l.* per fathom, and whole to surface. At present only a few tributers are at work in it, but as it is opened out others will be employed, and greater returns will be made. To carry on these two points, including engine charges, will cost, the agent thinks, about 200*l.* a month. The returns, to commence with, would be about 100*l.* to 150*l.* In conclusion, the Chairman moved the adoption of the accounts and agent's report.

The motion having been seconded, Mr. ALFRED THOMAS said their only hope was to restrict the costs at the mine.

Mr. PERKINS thought they ought to have some independent enquiry as to the value of the mine, and what justification Mr. Roberts had for giving the reports he had.

Mr. ALFRED THOMAS said the statements made by the agent had been perfectly correct. He had ascertained that from sending his own agent to the mine from time to time. They did not want the expense of having the mine inspected. There were all the indications of mineral wealth, but they had not so far been fortunate in finding it.

The CHAIRMAN said the price of metals was against them.

On the suggestion of Mr. ALFRED THOMAS it was understood that the operations of the mine in the future should be confined to driving the two ends—the 90 west, and the 102 east—but that they should set as much tribute as they liked so long as no greater tribute than 13s. 4d. in 1*l.* was given to the miners, in addition to stoping the ground between the 102 and 90.

The motion was then put and carried.

A call of 2s. per share was then made, and the proceedings terminated in the usual manner.

WHEAL COATES MINE COMPANY.

A meeting of shareholders was held at the mine, on Monday,

The Hon. ASHLEY PONSONBY in the chair.

The financial statement was submitted, showing labour costs and merchants' bills, 868*l.* 4s.; and credits, 1119*l.*, including 500*l.* brought forward from last account.

Mr. JOHN B. REYNOLDS remarked that there were no liabilities due and unpaid, and, of course, there were no arrears of calls. He wished every mine in Cornwall were in a similarly favourable condition. The subjoined reports of the manager (Capt. W. Vivian), and of Capt. Josiah Thomas, were read:—

June 16.—Since the last general meeting of shareholders, held on Feb. 19 last, we have continued to push on the cross-cut south in the 80, but have not yet intersected the lode. In the 80, driving west on the copper lode, at the time of the last meeting we had a lode at this point worth 12*l.* per fm., but it did not continue more than 2 fms. The lode for the distance driven since is poor. We still continue to push on the end by six men; the lode is at present worth 5*l.* per fathom. We have put up a rise in back of this level, and have holed to the 70. The rise was poor until 2 fathoms before we reached the 70 fathom level. We have now let a pitch in bottom of the 70 to eight men, at 10s. in 1*l.* tribute, both for tin and copper. In the 70 west, we have a very promising copper lode, but in the last 9 ft. driven the water so much increased that I suspended the driving, fearing that we should drown the mine. I would now recommend that the cross-cut in the 80 be pushed on with all speed by eight men, in order to intersect the West Kitty Flat lode.—WM. VIVIAN.

June 14.—I inspected this mine yesterday, and the following is my report:—The principal workings in the mine have been on the north lode, on which the engine-shaft is sunk to the 80. There is nothing being done on this lode at present, and I find from the sampling book that when it was last worked by tributers (who no doubt selected the best part of the lode) the tinstuff was of very low quality, producing only from 18 to 20 lbs. of black tin to the ton of stuff. Such stuff as this cannot possibly be worked to advantage unless the price of tin is exceptionally high. I cannot, therefore, recommend the sinking of the shaft for the purpose of exploring this lode to a greater depth at present. The south lode has been intersected by cross-cuts from the north lode at the 70 and 80 of about 15 fms. in length. The 70 is driven 25 fms. west of the cross-cut, and produced some rich copper ore for several fathoms in length, with a little tin. For the last few fathoms driving, since passing through a cross-course, the end has been very wet, and large quantities of water are still issuing therefrom. The lode in the end, however, is large, and of a very promising appearance for the production of copper. It contains a little copper ore, but scarcely enough to be of much value. The 80 is driven west under the ore ground met with in the 70, but the lode has not been so productive. The end produces some rich quality copper, and is worth probably 5*l.* per fathom. This end is about 10 fms. behind the 70, and has not yet reached the cross-course. A winze has been holed from the 70 to the 80, and this ground is now being worked on tribute.

The 80 cross-cut is being driven south for the purpose of intersecting West Kitty lode, which is believed to exist in that direction. About 19 fms. south of the south lode a small lode was met with containing a little tin. The cross-cut is now 28 fms. beyond this, or upwards of 60 fms. altogether from the engine or north lode. It is impossible to say with certainty how much further the cross-cut will have to be driven to meet with West Kitty lode; but after considering the matter with Capt. Vivian, and examining the plans of the district, &c., I think it probable that it may be intersected in 50 fms. further driving at the utmost, and possibly at a very much less distance. The two points that seem to me to be most worthy of trial are the 70 west on the south lode and the driving of the 80 cross-cut south to intersect West Kitty lode. The danger in driving the 70 west is that the quantity of water may still further increase and overpower the pumping-engine and pitwork. Of course a more powerful pumping-engine could be erected, but there is nothing in the mine at present sufficiently productive or promising to warrant such a large outlay as this would involve. In my opinion, therefore, the wisest course now will be to drive the 80 cross-cut south as rapidly as possible, for the purpose of intersecting West Kitty lode. If a good lode should be met with you may be able to afford to run the risk of driving the 70 further west, even if it necessitates the erection of a larger pumping-engine.—JOSIAH THOMAS.

The CHAIRMAN, in moving the adoption of the report and accounts, said he thought on the whole they were satisfactory. At one time they had under consideration the advisability or otherwise of erecting a more powerful pumping-engine. But it must be remembered that to do this would throw them back from three to four months. In the meantime—to use an expression common in mining—the mine would be drowned out, and would have to be pumped dry again. What Capt. Josiah Thomas and Capt. Vivian had resolved upon was this—that they should stop all work that produced more water than could be managed, and that they should go forward as fast as possible in driving the 80 cross-cut to cut the West Kitty lode. Capt. Vivian intended to work as hard as he could to cut that lode and stop all other work. This would probably necessitate an outlay of 120*l.* or 150*l.* a month if they did not sell any other ore; but if they did sell, as now, having tributes, the outlay would be reduced to 110*l.* or 120*l.* a month. When they had proved cutting the West Kitty lode they would probably erect a more powerful pumping-engine, sink a new shaft, and raise some shallow work. They did not make a call last time, nor did they propose doing so that day.

Mr. HITCHINS remarked that Capt. Thomas was a very confident authority, but he was of opinion that it would be well to continue to drive the 70.

Capt. VIVIAN submitted that if they drove the 70 end probably by next Saturday the engine would be drowned.

Mr. F. W. MICHELL approved the course recommended by Captains Thomas and Vivian.

Mr. D. ROBINSON seconded the proposition, and it was carried unanimously.

Mr. G. C. HANCOCK informed the shareholders that the lords of Ty-Tyas had offered to forego their dues during pleasure, in the hope of encouraging the company.

Mr. JOHN B. REYNOLDS was sure all the adventurers would feel indebted to Mr. Hancock for this information, and he moved a vote of thanks to the lords with regard to the working of the mine. For his own part he was certainly inclined to agree with Mr. Hitchins before he had an interview with Capt. Josiah Thomas, because he had not gone so fully into the matter as he might have done with Capt. Vivian. Captain Thomas assured him that the principal object to be attained in that mine was the cutting of West Kitty lode. He (Mr. Reynolds) felt all the greater interest in this being done, because if the lode were cut rich it would have a highly beneficial influence on mining generally in the locality. He thought that where the lode would be cut would be some distance from the rich course of tin which they now had at West Kitty. The distance was about one mile. He could assure Mr. Hitchins that if in pushing on the level in the 70 they did overpower the mine he could not rally the shareholders to put in new machinery to unwater the mine, considering the distance they had to drive to cut West Kitty lode. He was positive the advice of Capt. Thomas and Capt. Vivian was the only possible advice they could adopt.

On the proposal of Mr. M. T. HITCHINS, Messrs. Ponsonby, D. Robinson, S. J. Hobson, J.P., F. W. Michell, S. Payne, and J. B. Reynolds were re-elected as committee.

Votes of thanks were passed to the Chairman and the officers of the company and duly acknowledged.

WHEAL JANE.—At the meeting, on June 13, the accounts showed a loss on the four months' working of 1234*l.*, and a debit balance of 1201*l.* A call of 3s. per share was made. Captain W. Rich thought the point for them to consider was whether it was not wiser to work shallower. It would be better to put the money in labour instead of coals. There were very great chances of work for generations above the adit. It was evident the bottom of the mine would not pay. Captain Southey endorsed Captain Rich's remarks as regarded working above the adit. The Chairman announced that the lords had consented to remit the dues for 12 months, and had made no application for arrears. Mr. Tremayne and his partners had agreed to afterwards permanently reduce them from 1-18th to 1-24th. Mr. T. Williams moved, and Mr. R. Mitchell seconded, "That the committee be requested to confer with the lords as to the future plan of operations in the mine, and take such steps as they may deem best in the interests of the shareholders." Carried. The Chairman, in reply to a vote of thanks, said it was very up-hill work in the mine, but he did not despair. If they got the lords to meet them fairly, they might yet be able to save the property for the shareholders.

LEVANT.—At the meeting, on Tuesday, the accounts showed a profit on the four months' working of 224*l.*, reducing the debit balance to 99*l.* 9s. The purser said that tin and copper had been going down during the last 12 months, with the result that for two or three accounts there had been a small loss. Now a small profit had been made in spite of still lower prices. The mine was opening up fairly well, and their ground was sufficiently productive to give good dividends if prices would only improve.—Capt. R. Boyns confessed he was a little disappointed that there was not a greater profit on 7000*l.* worth of mineral raised. Still Levant's was a better account than many mines in Cornwall, which had losses by wholesale.—After several other speeches, Mr. R. Quick said that what he had listened to was mining twaddle, worth no more than his old hat, which was cut to pieces at the last accident. The old Levant lode was gone to the dogs. They should try the rock borer for four months, then abandon it and never use it again. It had cost them 10,000*l.*, and the adventurers had never had a shilling return. (The Purser: The adventurers did not pay for it.) Except for some special object, such as they had in Levant, the man who would work the small lodes in St. Just mines with a boring machine was the vilest idiot alive. It would knock up every mine in the parish. In case the north lode failed they had nothing to fall back upon. Let the agents work the eastern part of the sett. Levant was the richest bal in the parish; see what it had done without making a call for six or seven years—had a rock borer, new engine, calciner and arsenic flues, and a lot else. About 200,000*l.* had been spent in enterprise, which always meant robbing the outside shareholder. It was never meant for the outside shareholder to have a shilling.—Capt. R. Boyns agreed that the rock borer was only useful in St. Just mines, where some well-defined object for developing had to be attained; and Capt. H. Boyns spoke of the tens of thousands pounds profit St. Just mines had paid. They had worked legitimately and profitably, and cheaper than others in the county. They had never spent shareholders' money simply to raise mineral at a loss, and without developing the mine, as was done in other places.—The discussion was kept up for some time.

WEST FRANCES.—At the meeting, on June 13, the accounts showed a profit of 727*l.* on the four months' working, reducing the debit balance to 6897*l.* A call of 1*l.* 4s. per share was made. Capt. Josiah Thomas remarked that he was underground on the previous day, and took some samples from the lode in the highest point of the rise. The average produce was fully 1½ cwt. to the ton of stuff. They had reported the lode to be worth only 40*l.* per fm.; that was calculating the produce on the basis of 100 lbs. per ton, so that they believed they were quite within the mark. He was exceedingly well pleased with the result of the last four months' working. Of course, if their only object had been to raise as much tin as possible without reference to anything else, they could have raised a great many more tons, but their principal object had been to get up the rise towards the new shaft as quickly as possible. They had gone up 70 fathoms in the rise in seven months in blasting ground. This, he believed, was the most rapid piece of work ever done in connection with Cornish mining. He had never seen anything like it in his experience, and he doubted whether anyone else had. The discovery they had made in West Frances was one of the best that had been made in the county of Cornwall for many years. He had reason to believe there was a very large deposit of tin to the west of the cross-course.—The purser said the most gratifying pleasure was that they had laid open so much more tin ground than they had taken away.—Capt. Thomas, in answer to a shareholder, said it was possible to get the shaft through in twelve months. It was only fair to say that Capt. Teague's ventilator in use in the mine could not be spoken of too highly. It was clearing the workings free of smoke and foul gases, and answered admirably the purpose for which the apparatus was designed. He also warmly commended the efficiency of Mr. Harris's Champion rock-drill. He did not think there was a better machine of the kind in the market, even if there was an equal.

At the Chesterfield and Derbyshire Institute of Mining, Civil, and Mechanical Engineers on Thursday the following will be the agenda: The election of officers for the year 1884-5 will be determined by scrutineers of the voting papers appointed by the meeting. New members elected by ballot will be announced. The general report of the council, and their finance report, with abstract of the accounts of the past year, in connection with the proposed amalgamation with the Midland Institute, Barnsley, of which notice was given at the April meeting, will be moved on behalf of the council, or such modification thereof as the council may in the meantime be advised to submit:—"That circulars having been sent to every member of the Institute inviting expression of opinion as to the proposed amalgamation, and out of the 83 replies received, 69 being favourable to the scheme, only four dissenting altogether, and the remainder as to minor detail—resolved, that the amalgamation be proceeded with." The papers open for discussion will be that by Mr. Henry Fisher "On a System of Endless Rope Haulage in Use at Clifton Colliery, Nottingham, with remarks on various Clutch Gears in use, and a description of a New Frictional Clutch for Hauling-Engines and other Machinery," and that of Mr. J. B. Marsaut (translated) entitled "Miners' Safety Lamps."

ENGLAND'S INDUSTRIAL SUPREMACY IN THE MANUFACTURE OF IRON*—No. I.

BY SIR FRANCIS C. KNOWLES, BART., M.A., F.R.S.

Tollite cuncta inquit cœptosque auferte labores
Ætnei Cyclopes, et huc advertite mentem.
Arma acri facienda viro: nunc viribus usus,
Nunc manibus rapidis, omni nunc arte magistra
Præcipitate moras; nec plura effatus: at illi
Ocius incubuere omnes, pariterque laborem
Sortiti: fluit æs rivis, aurique metallum,
Vulnificusque chalybs vasta fornace liquescit.
Ingentem clypeum informant unum omnia contra
Tela Latinorum; septenosque orbibus orbes
Impediunt: alii ventosis follibus auras
Accipiunt redduntque: alii stridentia tingunt
Æra lacu: gemit impositis incudibus antrum.
Alii inter sese magnâ vi brachia tollunt
In numerum, versantque tenaci forcipe massam.
Virgil: Æneid, viii., 439—453.

The letters of Messrs. Creed and Williams, recently published in the Times, giving the origin, the state, and the prospects of the iron industry of Belgium, and comparing its advantages and disadvantages, material and social, with those of our own country, have attracted a considerable share of public attention, not without some alarm among our own siderurgists. This alarm receives some countenance, perhaps some justification, from the continued depression of the iron trade in Great Britain, accompanied as it has been by the actual importation of Belgian iron into our markets, and by our loss of contracts abroad in favour of Belgian establishments, but most of all from the extended organisation, and the exorbitant pretensions of trades' unions at home. These letters in the Times are written with considerable ability, though not unaccompanied by a spirit of parade which somewhat detracts from their authority, and a prepossession of morbid apprehension which is not the most favourable mental condition either for the collection of facts or for the drawing of sound conclusions from them.

It would be ungracious to suggest that Mr. Williams, who admits his own interest in a "speciality" of iron, has himself suffered from this Belgian competition; still it would be desirable that this point should be cleared up in order that we may be enabled to see how far he entered upon his enquiry quite impartially, or under a bias obviously predisposing him to despondency. Such an enquiry, above all if conducted in a foreign country, requires not only local mineralogical knowledge and attention to a number of very minute details, but also knowledge of the habits and character of the people who are to furnish the information in a case where one side of the issue is to be so flattering to their national vanity.

Now, it requires little more than a cursory perusal of these letters, by anyone even partially possessing such knowledge in order to be satisfied that it is just on those very points on which the author's statement is defective. The statistical data afforded by the officials of the Belgian Government are sufficiently trustworthy, and were, no doubt, given with all the courtesy and kindness usual on such occasions; but, in support of the conclusions at which Messrs. Williams and Creed have arrived, they are meagre to the last degree. The item of "minerals," for example (see letter in Times, Dec. 15), includes not only minerals of iron, but those of all other kinds (lead, zinc, &c.), so that any attempt to determine the average yield of the ores in the blast furnace is hopeless, yet this is an economical element of great importance. Equally defective is the information given of the yield of coke per ton of coal, of the smelting power of the coke itself, of its cost, as well as that of the iron ore on the furnace bank, and of the average weekly yield of the blast furnace. Messrs. Williams and Creed do, indeed, put down the cost as 16s. to 18s. per ton of coke, and 10s. to 12s. per ton of ore, but is this the average or the prices of those at some particular work? The yield of the blast furnace is given at above 200 tons, but if we divide the total pig-iron, 392,178 tons by 52 (weeks), and by 46 (blast furnaces), we get about 160 tons only—a difference of 25 per cent., showing that a yield of 200 tons is quite exceptional. Now, we all know that it is at the blast furnace that the money is chiefly made, for pig metal is almost our raw material. Again, nothing is said of the purity of the coals and of the ores, an element which is perhaps the most important of all, inasmuch as that a large contamination of sulphur or of phosphorus in the cast metal not only leads to a yield of wrought-iron of very inferior quality but adds largely to the cost of the best that can be made from it, and the more so the nearer we approach to the ultimate stages of manufacture. We propose presently to address ourselves specially to this part of the subject, and we think that the evidence which we have to offer will prove conclusively that the statements of Messrs. Creed and Williams as to the quantity and the quality of the Belgian iron must be either wholly erroneous or based upon very limited observation.

We do not propose to weary our readers by a detailed description of the iron ore deposits of Belgium, which are very capricious in their composition, and are irregularly distributed over a large tract of the country. It will be only necessary to observe that, according to information which we have derived from a very intelligent furnace manager at an establishment manufacturing iron wire (for which quality is the first essential), the best minerals of the basin are becoming annually more scarce. Unless, therefore, fresh deposits of magnitude can be discovered and opened up, which does not seem to be anticipated, the best fields being exhausted, the Belgian iron-master must either be contented with the inferior qualities, and evade their effect upon his iron by improved methods, or seek abroad for his supplies; thus, in either case, placing himself under a disadvantage in his competition with the British manufacturer. It has been suggested that there might be found very large deposits between Rhisne and Ligny (province of Namur), arguing from analogy to the rest of the basin (that tract not having been explored), but it remains to be seen whether this will be realised.

The ores of Belgium, as will be seen from various analyses which we give below, differ very much in the nature and proportions of their earthy ingredients, a point upon which turns not only the economy and the perfection of the furnace work, but also the quality of the cast metal produced from them. It must be admitted that the Belgian smelters evade these irregularities with great skill by their judicious combination of the ores in their charges for, generally speaking, nothing can be more perfect and beautiful than their furnace work. There is nothing to be seen like our cinder heaps in Wales and elsewhere containing in large masses above 18 per cent. of iron, and our furnace managers might well take a hint in these scientific adjustments from their Belgian rivals.

It will be found that whatever other differences the Belgian iron ores may present they are divisible into two great classes of very marked difference in geological position, in physical and chemical constitution, and in external aspect. These classes are—

The limonite, limnite, or brown hematite (hydrated peroxide of iron), and

The oolitic red peroxide of iron, or oligiste as it is called.

In addition to these there is to be found sparingly a carbonate of iron (though not a true spathose or stanlstein) which must be of great value and importance to the Sersing Company who possess the deposit at Angleur, near Liege. They employ it in all their mixtures in the blast furnace where it yields metal of extraordinary strength, and what is perhaps no less important they use it to garnish (*Anglice*, fettle) the bottoms of the puddling furnaces. Its composition according to the analysis of M. Montefiore is as follows:—

Protoxide of iron	46·60
Carbonic acid	29·70
Combined water	10·20
Gelatinous silica and sand	2·50
Oxide of zinc	11·00
	100·00

Iron in the calcined ore, 60 per cent.

It is said that oxide of zinc has a marked beneficial influence on the quality of the iron. We think it fair to state at once this advantage possessed by the first and greatest establishment in Belgium, but it is quite exceptional, and in any great struggle between the Belgian and the British ironmaster its effect would be quite insensible, even if the supply of the ore were not sure in no long time to be exhausted.

We return, then, to the other two classes of ores, and first of the limonite as it is called in Belgium. This is found in beds† in the arrondissement of Charleroi between the carboniferous series and the schistose rocks to the south of the coal series proper. It is similarly situated in the province of Namur. Some of these deposits contain pyrites (sulphuret of iron) to the decomposition of which they appear to owe their origin. Others rest upon a layer of carbonate of iron from which they too have resulted by decomposition. In the province of Namur it is found in veins in a calcareous zone lying between bands of quartzo-schistose. They are deposited in the hollows of the limestone. The colour of the ore varies from yellow to a deep brown and blackish brown with occasional reddish streaks. The massive parts inclosed in the ochreous matter are in concretions often hollow, disclosing kidneys of fibrous hematite, and contain argillaceous matter. They are often the mere crust of masses of yellow fibrous pyrites which require much labour and care in its removal. The writer has seen lumps of these pyrites at the mouth of a pit to the S.W. of Rochefort, on the left of the road to Hans-sur-Lesse, weighing fully 1 cwt., and small grains are often intermixed with the ores in their crude state. This ore is washed in a lavoir on the River Homme, and thence carted about a league to the Jemelle station whence it goes by rail to Charleroi and Couillet. It occurs like the rest in hollows or fissures in the limestone beds. At Durbuy, in the north of the province of Luxemburgh, this ore is found in beds and very irregular veins or threads in the transition formations. The site is composed of beds of schist and of limestone in which the mineral is indifferently distributed.

In the southern part of the province it is found in the secondary formations. It consists—1. Of rounded grains of the size of a pea, larger or smaller, of limonite in texture, more or less distinctly testaceous, brownish and lustrous on the surface.—2. Of fragments of different size of compact brown limonite with a surface more or less polished as if by friction. It is disseminated in the brownish yellow ferruginous mud forming sometimes irregular masses in the bathonian limestone, sometimes superficial masses in the beds of the liassic group. The bathonian limestone presents fissures with rounded surfaces as if they had been acted upon by a solvent fluid, and these fissures are filled up with brownish mud in which the iron ore is irregularly disseminated. Fallen minute fragments of the rock and shells are also contained in it. M. Dumont was of opinion that these fissures were filled with mineral water holding iron in solution and argillaceous matter in suspension, and that the latter was deposited mechanically while the former was precipitated chemically like the calcareous concretions of Tivoli. The acid solution acting on the walls of the vein has detached fragments of it, and it has contained shells which have fallen into the general mass. We venture to add that the acid can only have been sulphuric; for if an acid carbonate had deposited carbonate of iron (chalybete) it would have been free from pyrites and sulphate of lime, both of which (see below) we found in it. These limonites require to be washed at least once, often twice, after being handpicked to free them from the sulphuret of iron, and in some works undergo, lastly, calcination before they are fit for the furnace. It is not worth while to work ore which after washing yields less than 40 per cent. of its volume in the raw state.

† "Rapport au Roi sur les mines, &c., de la Belgique," 1842.

CONSUMPTION OF FUEL IN LOCOMOTIVES.

During the past 20 years, says Mr. GEORGES MARIE, engineer of the Paris and Lyons Railway, in an interesting paper read before the Institution of Mechanical Engineers, a great advance has been made in regard to economy of fuel in steam-engines. In marine-engines remarkable results have followed from the general use of compound cylinders and surface condensers, for whereas their consumption was formerly from 3½ to 4½ lbs. per indicated horse power per hour it has now been reduced to about 2 lbs. and sometimes even less. Equally good results are obtained with Corliis engines. This progress in economy of fuel has led to the endeavour to effect a corresponding reduction in locomotives. But before the ordinary build of locomotives so long in vogue is abandoned their exact consumption ought to be ascertained. Generally it is measured in lbs. per mile, but that mode is not a convenient one for comparison, because it takes no account of gradients, weight of train, speed, and train resistance, all of which are so variable that the bare statement of consumption per mile is of scarcely any value. The only proper way of reckoning the consumption, so as to admit of comparison under different circumstances, is in lbs. per horse power per hour, and this is accordingly the method described in the present paper as applied to locomotives under ordinary working conditions. There is a general impression that locomotives consume as much as from 4½ to 5½ lbs. of fuel per horse power per hour. With a view to dispel this very prevalent error the author can quote experiments made by him during the last few years, which show an average consumption in good locomotives of 3·35 lbs. when the horse power is measured by the work done at the circumference of the driving-wheels, and of 2·91 lbs. when it is measured by the indicator diagrams, the fuel being of good quality and the firing done with care. Comparing this with the marine-engine consumption of 2 lbs. per indicated horse power it is seen that locomotives are much more economical than is usually supposed, considering that they work non-condensing, while marine-engines enjoy the great advantage of condensation.

The author has proved that with a good locomotive and a good driver the consumption of fuel and water is—Consumption of fuel per effective horse power per hour, 3·27 lbs.; consumption of fuel per indicated horse power per hour, 2·88 lbs.; ratio of consumption of water to consumption of fuel, 8·88 lbs.; ratio of dry steam produced to fuel consumed, 8·08 lbs. Prof. Hirsch attributes these satisfactory results to—1. The total heating surface of the boiler is very large compared to the grate surface (96 to 1), so that the boiler absorbs the heat of the gases very completely.—2. The cylinders of the locomotive are very large, according to the late Mr. Marié's system, so that the grade of expansion is high.—3. The locomotive was very well looked after, which is an important point in economy of fuel. The author also refers to some experiments made by Mr. Regray, chief engineer of the Eastern Railway of France; they were made with an indicator on a new system, giving diagrams at the highest speeds, without the errors of the ordinary indicator. Mr. Regray on this system takes the diagrams at some distance away from the locomotive itself; the indicator is in a special van, with several dynamometers, speed indicators, &c. This van was shown at the Electric Exhibition in Paris, and obtained one of the highest prizes. Mr. Regray made a few experiments on consumption of fuel in express engines hauling express trains; the result was 3·01 lbs. per indicated horse power as an average and 2·48 as the minimum. This is a very satisfactory verification of the author's result—2·88 lbs. per indicated horse power. It is important to notice that these very close results have been arrived at by two methods as different as they could possibly be. The fuel employed in Mr. Regray's experiments was not patent fuel, but ordinary small coal from Bascoup, in Belgium.

These satisfactory results confirm what the author's father always maintained—that locomotive engineers ought to use large heating surfaces and large cylinders; he always built his own locomotives by that rule. The author has thus endeavoured to prove that locomotives are not so imperfect as engineers generally believe as regards economy of fuel. Assuredly the locomotive is a very simple form of engine, but simplicity is of great importance with the very high piston speed of locomotives. That speed, however, is very favourable to economy in fuel (contrary to the opinion of some engineers), because it diminishes the leakage of steam and the condensation of steam during admission. A locomotive working with a very slow piston speed is not so economical as with a high speed. Express engines give better results than mountain engines, as is seen by Mr. Regray's experiments, where the consumption attained the very low figure of 2·48 lbs. per indicated horse power under the best circumstances.

The author has no intention of implying that locomotives will not be improved—in fact, he proposes to indicate further on the probable directions of improvement; but before abandoning the ordinary system he thought it would be interesting to make exact experiments, giving the consumption of fuel per horse power. Comparative tests with the various kinds of new locomotives ought to be made, and with the same accuracy. Unfortunately different drivers working in the same circumstances and with the same kind of locomotive show consumptions of fuel varying by from 10 to 20 per cent., according to their skill; this is a serious difficulty in making such comparisons between various systems of locomotive.

If the boiler pressure be not higher than in ordinary locomotives the author thinks the economy of fuel cannot be greater in the compound engine than in the best ordinary locomotives. With the ordinary boiler pressure of nine atmospheres, or 135 lbs. per square inch, the ordinary valve gear gives expansion enough, provided the cylinders be large enough, which is not always the case. The compound system lessens the injurious effect of the clearance spaces, and also diminishes the condensation of the steam during admission; but these two advantages are neutralised by the disadvantage of the steam being throttled in its passage from the first cylinder to the second, especially at high speeds. In other words the consumption of fuel in a compound engine could not in the author's opinion be much lower than that given in the present paper, the boiler pressure being the same. This point would be readily settled by a few experiments on the consumption of fuel per horse power per hour in the compound locomotive including lighting up. The particular locomotives of ordinary class with which the compound engine has been compared by Mr. Webb appear to the author to be somewhat too heavily loaded for the best economy, their cylinders being smaller than those of the express locomotives on the Paris and Lyons Railway, which have cylinders of 19·7 in. diameter and 24·4 in. stroke, with 6 ft. 6 in. driving wheels. Fuel being very expensive on this line the author's father always made his engines heavy, but very economical; and these express engines, which were designed by him, and built at the works of the Paris and Lyons Railway and of Messrs. Sharp, Stewart, and Co. are some of the most economical locomotives there are. The author has indeed made experiments in which on the same kind of line, and at the same speed, and with the same total weight of train the consumption of fuel was almost exactly the same as in the latest experiments with the compound locomotive; but he cannot look upon such a comparison as of great value, because it is impossible to estimate precisely the difference of circumstances in the two cases. The further experiments he has suggested with the compound engine seem, therefore, to be needed for a fair comparison.

In his own experiments the author has found nine atmospheres, or 135 lbs. per square inch, to be the maximum boiler pressure for obtaining good expansion with ordinary valve gear and with cylinders of ordinary size. With higher pressures either better valve gear must be employed or the compound system, and the latter is considered decidedly preferable by the author, who has shown that great economy of fuel can be obtained with a high boiler pressure. In the compound locomotive the boiler is very light and very strong, and the author looks forward to the pressure of steam being yet further increased during the next few years without making the engine too heavy for the rails. It will then be a necessity to adopt the compound system for obtaining good expansion; and the compound locomotive, without being too heavy, will then unquestionably be much more economical than ordinary engines could be, and will be well adapted for high speeds. Goods engines of the ordinary kind are not so economical in consumption per horse power per hour as express engines; and the author anticipates, therefore, even better results from the compound system in goods engines than have been obtained with express locomotives. The compound system with yet higher boiler pressure will thus in his opinion turn out to be the greatest improvement in locomotives since the time of Stephenson.

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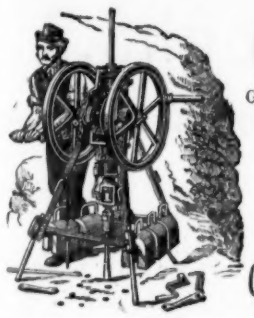

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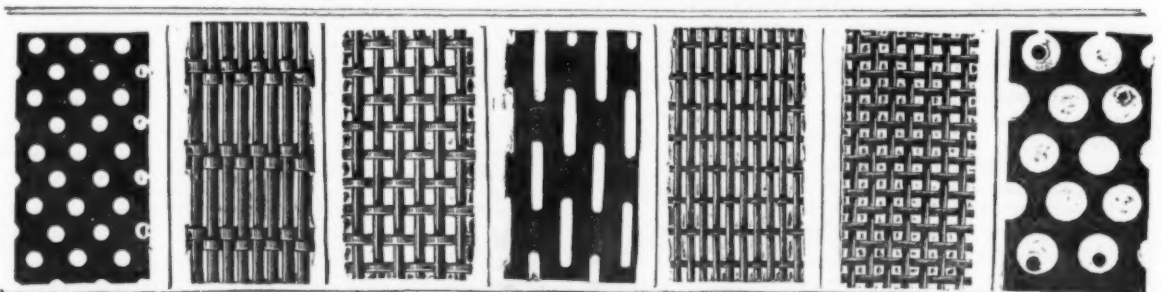

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